CURRICULUM & SYLLABUS

OF

Higher Secondary Education

(CLASSES—XI & XII)

GENERAL STREAM COURSE

WEST BENGAL COUNCIL OF
HIGHER SECONDARY EDUCATION

VIDYASAGAR BHAVAN
9/2, BLOCK DJ, SECTOR-II, SALT LAKE
KOLKATA—700 091

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PREFACE

"Curriculum and syllabus of Higher Secondary Education (Class XI and XII)" containing the revised syllabi of the general stream of courses was published by the West Bengal Council of Higher Secondary Education in June 2003. After this publication the Council had decided to re-examine and analyse once again the course content of eight subjects – Bengali, English, Nepali, Urdu, Mathematics, Physics, Chemistry and Biological Sciences. Some addition / alteration of topics and alteration of distribution of marks in the syllabi of these eight subjects contained in the above mentioned booklet of June 2003 were decided upon.

The revised syllabi for the subjects of Bengali 'Ka', English 'B', Nepali 'A', 'B', Urdu, Mathematics, Chemistry, Physics and Biological Sciences were officially circulated on 24th August 2004.

We now publish a booklet containing the changed syllabi of the above subjects only, to be followed henceforth by the educational institutions in place of the syllabi of June 2003. Academic institutions and individuals may now collect a copy of the revised publication from the Council on production of the payment receipt for the purchase of the previous one.

West Bengal Council of Higher Secondary Education express its sincere gratitude to all these who have readered valuable suggestions and assistance at various levels, making this extremely important process of wide-ravision work possible.

Vidyasagar Bhavan
25th November, 2004

Gopa Dutta
President
West Bengal Council of
Higher Secondary Education

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পাঠ্যসূচির লক্ষ্য ও উদ্দেশ্য

বাংলা—পাঠক্রম 'ক'

১। (ক) ছাত্রছাত্রীদের বাংলা গদ্য ও পদ্য ভাষার বৈচিত্র্য সম্পর্কে সচেতন করা এবং নিজেদের চর্চার ক্ষেত্রে চলিত ভাষায় নানামুখী প্রকাশসামর্থ্যের সমৃদ্ধি সাধন।

(খ) প্রথম পত্র ও দ্বিতীয় পত্রের সমস্ত নির্বাচিত পাঠের মাধ্যমে সাহিত্য বা কাব্যগুণ নির্ধারণ ও বিশ্লেষণের ক্ষমতাবৃদ্ধি।

(গ) সাহিত্যের মধ্য দিয়ে শুধু ভাষা বা শিল্প-চেতনা নয়, জীবনের নানা মহৎ ও বাঞ্ছিত মূল্যবোধের চর্চা।

(ঘ) * চিহ্নিত গদ্যাংশ, পদ্যাংশ, নাটক/নাট্যাংশ এবং সহায়ক পাঠ ২০০৫-২০০৬ শিক্ষাবর্ষ থেকে প্রচলিত হবে।

২। বাংলা সাহিত্যের ইতিহাস সম্পর্কে ব্যাপকতর পরিচয়ের উদ্দেশ্যে পাঠ্য বাংলা সাহিত্যের ইতিহাসের কালসীমা ২০০০ খ্রিস্টাব্দ পর্যন্ত নির্ধারণ করা হয়েছে। কিন্তু পাঠ্যের বোঝা যাতে না বাড়ে সেদিকে লক্ষ্য রেখে প্রাচীন ও মধ্যযুগের বিস্তারিত ইতিহাস সরল ও সংক্ষিপ্ত করা হয়েছে এবং আধুনিক যুগের ক্ষেত্রে বিস্তৃত পর্যালোচনার বদলে বিগত দুই শতাব্দীর বাংলা সাহিত্যের বিবর্তন-বিন্দুগুলিকে শুধু স্পর্শ করা হয়েছে।

৩। বাংলা ভাষার ইতিহাস ও বৈচিত্র্য সম্বন্ধে চেতনাবৃদ্ধির জন্য দ্বিতীয় পত্রের পাঠ্যভাগে বাংলা ভাষার সংক্ষিপ্ত ইতিহাস যোগ করা হয়েছে, এবং মাধ্যমিকের প্রসঙ্গগুলির পুনরাবৃত্তি যথাসম্ভব বর্জন করে বিভিন্ন ক্ষেত্রে ভাষার প্রয়োগগত অনুশীলনের উপর গুরুত্ব দেওয়া হয়েছে।

৪। যথাযথ ভাবে কবিতাপাঠের জন্য বাংলা ছন্দের প্রাথমিক ধারণাগুলি পাঠ্যতালিকায় আনা হয়েছে।

বাংলা - পাঠক্রম 'খ'

১। বাংলা সাহিত্যের শ্রেষ্ঠ ও চিত্তাকর্ষক কিছু রচনার সঙ্গে অ-বাংলাভাষী ছাত্রছাত্রীদের পরিচয় সাধন।

২। অ-বাংলাভাষী ছাত্রছাত্রীদের মান্য বাংলা ভাষায় কথা বলা ও লেখার ক্ষমতা বাড়ানো।

এই পাঠ্যসূচির নির্মাণ ও নির্ধারণে একদিকে পশ্চিমবঙ্গ মধ্যশিক্ষা পর্ষদের বাংলা পাঠ্যসূচি এবং অন্যদিকে নানা সর্বভারতীয় শিক্ষা ব্যবস্থাপনা প্রতিষ্ঠানের (সি . বি. এস. ই., আই এস. সি. ইত্যাদি) বাংলার পাঠ্যসূচি লক্ষ করা হয়েছে। রাজ্য সরকার গঠিত পাঠ্যসূচি তুলনীয়তা সমিতির সুপারিশও সেই সঙ্গে বিবেচনা করা হয়েছে।

বাংলা 'ক' পাঠক্রম
(২০০৩)

প্রথম পত্র

মোট নম্বর—১০০

গদ্য	—	৪০
কবিতা	—	৪০
নাটক	—	২০

পাঠ্যসূচি

গদ্যাংশ

সীতার বনবাস	:	ঈশ্বরচন্দ্র বিদ্যাসাগর
গ্যালিলিও	:	ঈশ্বরচন্দ্র বিদ্যাসাগর
*ইস্পাতের মেয়ে	:	বঙ্কিমচন্দ্র চট্টোপাধ্যায়
বিড়াল	:	বঙ্কিমচন্দ্র চট্টোপাধ্যায়
প্রাচীন ও নবীনের দ্বন্দ্ব	:	শিবনাথ শাস্ত্রী
তৈল	:	হরপ্রসাদ শাস্ত্রী
শিক্ষার হেরফের	:	রবীন্দ্রনাথ ঠাকুর
*তোতাকাহিনী	:	রবীন্দ্রনাথ ঠাকুর
হৈমন্তী	:	রবীন্দ্রনাথ ঠাকুর
*শূদ্র জাগরণ	:	স্বামী বিবেকানন্দ
ফলিত জ্যোতিষ	:	রামেন্দ্রসুন্দর ত্রিবেদী
আমরা ও তোমরা	:	প্রমথ চৌধুরী
শুভ উৎসব	:	বলেন্দ্রনাথ ঠাকুর
পণ্ডিতমশাই	:	শরৎচন্দ্র চট্টোপাধ্যায়
গোড়ার কথা	:	সুভাষচন্দ্র বসু
অতীতের বোঝা	:	এস. ওয়াজেদ আলি
শক্তির সন্ধানে মানুষ	:	সত্যেন্দ্রনাথ বসু
তোতাকাহিনী	:	সৈয়দ মুজতবা আলি
রাজু পাঁড়ে	:	বিভূতিভূষণ বন্দ্যোপাধ্যায়
আমাদের সংস্কৃতির বিবর্তন	:	অন্নদাশঙ্কর রায়
*মানবতন্ত্র	:	আবুল ফজল
প্রতিশ্রুতি	:	আশাপূর্ণা দেবী
জাপানের জার্নাল	:	বুদ্ধদেব বসু
*শিল্পী	:	মানিক বন্দ্যোপাধ্যায়

পদ্যাংশ

নাটক ও নাট্যাংশ

কর্ণকুন্তী সংবাদ	:	রবীন্দ্রনাথ ঠাকুর
*পাপ-পুণ্য	:	রবীন্দ্রনাথ ঠাকুর
চন্দ্রগুপ্ত	:	দ্বিজেন্দ্রলাল রায়
অন্ন চাই প্রাণ চাই	:	বিজন ভট্টাচার্য
নীলকণ্ঠ	:	উৎপল দত্ত
লক্ষ্মীছাড়ার পাঁচালী	:	বাদল সরকার
*ঝাঁসীর রানির শেষ যুদ্ধ	:	তৃপ্তি মিত্র
চোখে আঙুল দাদা	:	মনোজ মিত্র
কাল বা পরশু	:	মোহিত চট্টোপাধ্যায়

বাংলা 'ক' পাঠক্রম
দ্বিতীয় পত্র
মোট নম্বর — ১০০

১। সহায়ক পাঠ	- -	১৫
২। বাংলা সাহিত্যের ইতিহাস (বড়ো প্রশ্নের জন্য ১৫ + টীকার জন্য ৫)	- -	২০
৩। প্রবন্ধ রচনা (অনধিক ৬০০ শব্দ)	- -	১৫
৪। বাংলা ভাষার সংক্ষিপ্ত ইতিহাস ও উপাদান	- -	২৫
৫। গল্প রচনা, পত্র রচনা, সংলাপ, প্রতিবেদন রচনা (যে কোনো একটি)	- -	১০
৬। পরিভাষা প্রয়োগ	- -	৫
৭। অনুবাদ - ইংরাজি থেকে বাংলা	- -	১০

সহায়কপাঠ : ছোটোগল্প

*গুপ্তধন	:	রবীন্দ্রনাথ ঠাকুর
বলাই	:	রবীন্দ্রনাথ ঠাকুর
দেবী	:	প্রভাতকুমার মুখোপাধ্যায়
শ্রী শ্রী সিদ্ধেশ্বরী লিমিটেড	:	পরশুরাম
ডাইনি	:	তারাশংকর বন্দ্যোপাধ্যায়
*শ্রীপতি সামন্ত	:	বনফুল

বাঘের বাচ্চা	:	শরদিন্দু বন্দ্যোপাধ্যায়
গান	:	বিভূতিভূষণ মুখোপাধ্যায়
হাড়	:	নারায়ণ গঙ্গোপাধ্যায়
বেটি	:	সুশীল জানা
সেতার	:	নরেন্দ্রনাথ মিত্র
পোস্টার	:	স্বর্ণকমল ভট্টাচার্য
*একটি তুলসী গাছের কাহিনী	:	সৈয়দ ওয়ালীউল্লাহ
*চতুর্থ পানিপথের যুদ্ধ	:	সুবোধ ঘোষ
আদাব	:	সমরেশ বসু
তালাক	:	মহাশ্বেতা দেবী
শোভনের জন্য বিজ্ঞাপন	:	তপোবিজয় ঘোষ

বাংলা ভাষার সংক্ষিপ্ত ইতিহাস ও উপাদান

ভাষা ও উপভাষার সম্পর্ক; বাংলার মৌখিক ও সাহিত্যিক উপভাষা; মৌখিক উপভাষার স্থান ও লক্ষণ; সাহিত্যিক গদ্য উপভাষার (চলিত, সাধু) বিবর্তন ও তুলনা।

বাক্য পরিবর্তন ঃ

অর্থগত ও গঠনগত

উক্তি পরিবর্তন ঃ

প্রত্যক্ষ ও পরোক্ষ

প্রবাদ-প্রবচন ও বাগ্‌ধারা ঃ

(ক) প্রবাদ-প্রবচন (proverb-২৫টি) ও (খ) বাগ্‌ধারা (idiom-২৫টি)-র প্রয়োগ

ছন্দ ঃ

১। মিশ্রবৃত্ত বা মিশ্র কলাবৃত্ত (অক্ষরবৃত্ত) / তান প্রধান

২। সরল কলাবৃত্ত (মাত্রাবৃত্ত) / ধ্বনি প্রধান

৩। দলবৃত্ত (স্বরবৃত্ত) / শ্বাসাঘাত প্রধান / ছড়ার ছন্দ

সাহিত্যের ইতিহাস

প্রাচীন ও মধ্যযুগ—নির্বাচিত বিষয় : বিবর্তনের সম্বন্ধে সাধারণ ধারণা; শাখাপ্রশাখা সম্বন্ধে ব্যাপকতর ধারণা।

আধুনিক যুগ—নবজাগরণ : সমাজ ও সাহিত্যে প্রভাব; রবীন্দ্রপূর্ব গদ্য, নাটক, কবিতা; রবীন্দ্রনাথের গদ্য, নাটক, কবিতা, রবীন্দ্রোত্তর বাংলা সাহিত্যের রূপরেখা।

বাংলা সাহিত্যের ইতিহাস

বিস্তৃত পাঠ্যসূচি

(দশম শতাব্দী থেকে বিংশ শতাব্দী পর্যন্ত)

মোট পৃষ্ঠা - ৮০

(বিগত দ্বিতীয় সহস্রাব্দই বাংলা ভাষা ও সাহিত্যের বিকাশকাল। এই হাজার বছরের বিস্তৃত পরিসরে বাংলা ভাষায় বাঙালির সাহিত্যচর্চা কীভাবে বিকশিত ও বিবর্তিত হয়েছে ছাত্রছাত্রীদের কাছে ধারাবাহিকভাবে তার একটা সংক্ষিপ্ত ও প্রাথমিক ধারণা দেওয়াই সাহিত্যের ইতিহাস সংক্রান্ত

এই পাঠক্রমের প্রধান লক্ষ্য। তাই এই পাঠক্রমের পঠন-পাঠন সংক্ষিপ্তভাবে মূলত তিনটি বিষয়ের মধ্যে সীমাবদ্ধ থাকবে : (১) সংশ্লিষ্ট যুগের সাধারণ ঐতিহাসিক অবস্থা, (২) সংশ্লিষ্ট যুগের সাহিত্যচর্চার সাধারণ প্রবণতা, (৩) সংশ্লিষ্ট সাহিত্যশাখার প্রতিনিধিস্থানীয় প্রধান প্রধান সাহিত্যিকের সাহিত্যচর্চার সংক্ষিপ্ত পরিচয়।)

প্রস্তাবনা

১। বাংলা ভাষার বিকাশের আগে বাঙালি কবিদের সাহিত্যচর্চার সংক্ষিপ্ত বিবরণ, বাংলা সাহিত্যের যুগবিভাগ : আদি, মধ্য ও আধুনিক। পৃ ২

আদিযুগ

২। চর্যাপদ : ঐতিহাসিক গুরুত্ব, সামগ্রিক সাহিত্যমূল্য, কয়েকজন প্রধান কবির নাম। পৃ ৩

মধ্যযুগ

৩। তুর্কি আগমন ও তার সামাজিক-সাংস্কৃতিক পরিণাম। পৃ ২

৪। শ্রীকৃষ্ণকীর্তন এবং বৈষ্ণব পদাবলির সংক্ষিপ্ত পরিচয় (আলোচ্য কবি বিদ্যাপতি, চণ্ডীদাস, জ্ঞানদাস ও গোবিন্দদাস) পৃ ৪

৫। অনুবাদ-কাব্য : রামায়ণ, ভাগবত ও মহাভারতের অনুবাদ সম্বন্ধে সংক্ষিপ্ত আলোচনা। পৃ ৩

৬। মঙ্গলকাব্য রচনার সামাজিক কারণ ও মঙ্গলকাব্যের সাধারণ বৈশিষ্ট্য। পৃ ২

৭। তিন মঙ্গলকাব্যের সংক্ষিপ্ত কাহিনি ও তিন বিশিষ্ট কবির (মুকুন্দ চক্রবর্তী, কেতকাদাস ক্ষেমানন্দ ও ঘনরাম চক্রবর্তী) সংক্ষিপ্ত পরিচয়। পৃ ৪

৮। বাঙালির সমাজ ও সাহিত্যে চৈতন্যদেবের আবির্ভাবের গুরুত্ব। পৃ ১

৯। দুটি প্রধান চৈতন্যজীবনী কাব্যের (বৃন্দাবন দাস ও কৃষ্ণদাস কবিরাজ) সাধারণ পরিচয় ও ঐতিহাসিক গুরুত্ব। পৃ ৩

১০। আরাকান রাজসভার কবিদের কাব্যচর্চার গুরুত্ব; দৌলত কাজি ও সৈয়দ আলাওল সম্পর্কে সংক্ষিপ্ত আলোচনা। পৃ ৩

১১। অষ্টাদশ শতাব্দীর যুগবৈশিষ্ট্য, যুগের প্রেক্ষিতে ভারতচন্দ্র ও রামপ্রসাদের কাব্যচর্চার সংক্ষিপ্ত পরিচয়। পৃ ৩

আধুনিক যুগ (ক) উনবিংশ শতাব্দী

১২। নবজাগরণের সংক্ষিপ্ত ইতিহাস : বাঙালির সমাজ ও সাহিত্যে তার প্রভাব পৃ ৪

১৩। গদ্যসাহিত্য : (ক) প্রধান ধারা - ফোর্ট উইলিয়াম কলেজের লেখকগোষ্ঠী (নামোল্লেখ করে সাধারণ পরিচয় ঈশ্বরচন্দ্র বিদ্যাসাগর, বঙ্কিমচন্দ্র)
(খ) বিকল্প ধারা : হুতোম প্যাঁচার নকশা পৃ ৪

১৪। বাংলা সাহিত্যচর্চার আধুনিকীকরণে ছাপাখানা; সংবাদপত্র ও সাময়িক পত্রের ভূমিকা : সংবাদ প্রভাকর, বঙ্গদর্শন - সংক্ষিপ্ত পরিচয়। পৃ ৩

১৫। কাব্য : (ক) মহাকাব্য ও আখ্যান কাব্য : সাধারণ পরিচয়
মধুসূদন সম্বন্ধে বিশেষ আলোচনা
(খ) গীতিকাব্য : (সংক্ষেপে লিরিকের বৈশিষ্ট্য আলোচনা) এই শাখার নানা কবির নামোল্লেখ করে বিহারীলাল ও তাঁর দুজন প্রধান অনুগামীর কাব্যচর্চার সংক্ষিপ্ত পরিচয়। পৃ (৩+৩)=৬

১৬। নাটক : মধুসূদন দত্ত, দীনবন্ধু মিত্র, গিরিশচন্দ্র ঘোষ পৃ ৪

১৭। কথাসাহিত্য : (ক) প্রধান ধারা - বঙ্কিমচন্দ্রের বিশেষ আলোচনা পৃ ৩
(খ) বিকল্প ধারা - তারকনাথ গঙ্গোপাধ্যায়, ত্রৈলোক্যনাথ মুখোপাধ্যায়

বিংশ শতাব্দী

১৮। এই শতাব্দীর প্রধান প্রধান ঐতিহাসিক ঘটনা, বাঙালির সমাজজীবনে ও সাহিত্যচর্চায় যেগুলির বিশেষ প্রভাব পড়েছে; সংক্ষিপ্ত বিবরণ (বিভিন্ন রাজনৈতিক আন্দোলন, দুটি বিশ্বযুদ্ধ, মন্বন্তর ও দেশভাগ - আলোচনায় এই চারটি বিষয়কে প্রাধান্য দিতে হবে)। পৃ ৪

১৯। কাব্য : সংক্ষিপ্ত বিবরণ ও বিভিন্ন প্রবণতার সাধারণ পরিচয় পৃ ৬
(ক) রবীন্দ্রকাব্য : প্রবণতা অনুযায়ী পর্ব বিভাগ করে আলোচনা।
(খ) রবীন্দ্রেতর : নজরুল ইসলাম, যতীন্দ্রনাথ সেনগুপ্ত, মোহিতলাল মজুমদার।
(গ) রবীন্দ্রোত্তর : জীবনানন্দ দাশ, সুধীন্দ্রনাথ দত্ত, সুভাষ মুখোপাধ্যায়।

২০। গদ্যসাহিত্য : সংক্ষিপ্ত পর্যালোচনা - রবীন্দ্রনাথ, প্রমথ চৌধুরী। পৃ ৩

২১। কথাসাহিত্য : (উপন্যাস ও ছোটো গল্প) সংক্ষিপ্ত পর্যালোচনা : পৃ ৬
রবীন্দ্রনাথ, শরৎচন্দ্র, তারাশঙ্কর, মানিক বন্দ্যোপাধ্যায়, বিভূতিভূষণ বন্দ্যোপাধ্যায়, পরশুরাম, প্রেমেন্দ্র মিত্র, বনফুল বিশেষভাবে উল্লেখযোগ্য।

২২। নাটক : সংক্ষিপ্ত বিবরণ। পৃ ৪
(ক) প্রচলিত ধারার নাটক : দ্বিজেন্দ্রলাল রায়, ক্ষীরোদপ্রসাদ বিদ্যাবিনোদ
(খ) রবীন্দ্রনাটক
(গ) গণনাট্য ও নবনাট্য : বিজন ভট্টাচার্য, উৎপল দত্ত।

২৩। সাময়িক পত্র : সবুজপত্র, কল্লোল, পরিচয় (প্রতি ক্ষেত্রে প্রকাশের কালসীমা, বৈশিষ্ট্য ও লেখকগোষ্ঠীর সংক্ষিপ্ত বিবরণ।) পৃ ৩

ENGLISH –'B'
(Revised in 2003)
PRELIMINARY NOTES

1. *Objectives of the course :*

   a) to effect a smooth transition from the Secondary to Higher Secondary level and from Higher Secondary to Degree level; to enhance communicative skills which might satisfy work-place requirements.

   b) to enhance comprehension and writing skills with special emphasis on independent writing. These should incorporate coherent description in logical sequence, handling information, reporting a dialogue, composing reports, short dialogues, letters and paragraphs.

2. Changes envisaged

   To shift emphasis from explanation of texts in classroom to developing writing skills, through exercises from the text. Selection of pieces on a much wider range of subjects and authors while keeping the length of individual pieces short.

   Objective-type questions, precis-writing and note-making to be dropped.

3. The topics marked with asterisk (*) are recommended to be effective from the session 2005-06.

PAPER I :

Full marks – 100

1.	**Prose**	**:**	**30 marks**
2.	**Poetry**	**:**	**30 marks**
3.	**Play**	**:**	**20 marks**
4.	**Textual Grammar**	**:**	**20 marks**

[10 marks for essay type question and 5(=3+2) marks for short answer type question.]

PROSE

A) Fiction

1) The singing Lesson	:	Katherine Mansfield
2) The Night-train at Deoli	:	Ruskin Bond
*3) Rajam and Mani (Malgudi Days)	:	R. K. Narayan
*4) Packing (Three Men in a Boat)	:	Jerome. K. Jerome.
5) The Last-Leaf	:	O. Henry
6) The Queer Feet	:	G. K. Chesterton

7) The Murder of Julius Caesar: S. E. Paces
(More Tales from Shakespeare)

8) The Devoted Friend : Oscar Wilde

9) To Build a Fire : Jack London

10) The Deadly Mission of Phineas Snodgrass : Frederick Pohl

*11) Further Progress in Specialisation : Stephen Leacock

B) Non-fiction

1) Meetings with Maharajah (Our Films Their Films) : Satyajit Ray
*2) The Struggle Against Dowry;: Manikuntala Sen
(The Search for Freedom)
3) Cosmos, chapter I : Carl Sagan.
4) Robert Frost at 80 (The English We Use) : J. Isaacs.
5) Ice helps to Light Fire (Physics for Entertainment) : Ya Perelman
6) Dream comes true : T. Norgey and Ulman
*7) Our Culture, Their Culture : Rabindranath Tagore
8) To Eradicate Untouchability : M. K. Gandhi
*9) The School I would like : by School Children (The Observer)
10) Silly Mistakes : Bertrand Russell
(Unpopular Essays)
11) Bringing up Baby (A Zoo in My Luggage) : Gerald Durrell
*12) Extracts from Life : Jim Corbett
at Mokameh Ghat
13) Women in Our : Violet Markham
Changing Society

14) Science and War : J. Bronowski

15) Bhopal; The Lessons of a Tragedy : S. Hazarika

16) "What a piece of work is man... quintessence of dust" : (Hamlet) Shakespeare

17) How to Read a Book (Extracts) : Virginia Woolf.

*18) Consequences of Environmental Plunder : Jean Drèze, Amartya Sen.

POEMS

1) The Divine Image : William Blake
2) The Lake Isle of Innisfree : W. B. Yeats
3) Old Familiar Faces : Charles Lamb
*4) The Owl : Edward Thomas
5) All That's Past : Walter De La Mare
6) On Television : Ronald Dahl
*7) Futility : Wilfred Owen
8) The Negro Speaks on Rivers : Langston Hughes
9) Cities and Thrones and Powers : R. Kipling
*10) The Solitary Reaper : Wordsworth
11) One Who Has Been Long in City Pent : Keats
12) The Light of Other Days : Thomas Moore
13) The Bells of Shandon : Francis Mahony
14) June 1915 : Charlotte Mew
15) The Old Stoic : Emily Bronte
16) The Children of the Poor : Gwendolyn Brooks
17) Thunderstorms : W. H. Davis
*18) Uphill : C. G. Rossetti
19) Sympathy : Paul L. Dunbar
20) The Village Song : Sarojini Naidu
21) Because I could not stop for Death : Emily Dickinson
22) London : Edward Bond
*23) The Moon (Two Extracts) : P.B. Shelley
24) Fidele : Shakespeare
*25) Nature : H. W. Longfellow
26) Going Downhill on a Bicycle : H. C. Beeching
*27) The Hero : Siegfried Sassoon
*28) Where the Mind is Without Fear... : Rabindranath Thakur

PLAYS

1) Arms and the Man : First Act	:	G. B. Shaw
*2) The Bishop's Candlesticks	:	Norman Mckinnel
3) Hewers of Coal	:	J Corrie

Textual Grammar

Transformation and syntheses of sentences, change of narration, use of prepositions, articles and phrasal verbs, wh-questions.

PAPER II :

Full marks – 100

Rapid Reader	:	**35 marks**
Comprehension. Unseen (Prose)	:	**25 marks**
Letter official & Personal	:	**10 marks**
Paragraph Writing	:	**10 marks**
ESP	:	**20 marks**

ESP : Reporting, dialogue, summary writing, notice, newspaper advertisement

Rapid Readers

1. The Kon-Tiki Expedition	:	Thor Heyerdahl
2. The Adventures of Sherlock Holmes	:	A. Conan Doyle
3. *The Story of My Life	:	Helen Keller

URDU
Paper-II
Full Marks—100

Rapid Reader	:	15
History of Urdu Literature	:	20
Essay Writing	:	15
Grammar	:	25
Story, Letter, Paragraph	:	10
Translation (From English to Urdu)	:	10
Phrases	:	5
		100

***Note** : Translation from Urdu to English to be dropped.*

NEPALI : 'A'
Paper–II
Full Marks–100

Essay Writing	:	15
Substance writing etc.	:	15
Grammar	:	25
Rhetoric & Prosody	:	20
History of Nepali literature	:	15
Translation	:	10
		100

***Note** : Translation from Urdu to English to be dropped.*

NEPALI : 'B'
Paper–II
Full Marks–100

Essay writing	:	15
Substance writing etc.	:	15
Grammar including Rhetoric & Prosody	:	45
History of Nepali literature	:	15
Translation (Nepali to English & Opposite)	:	10
		100

***Note** : Translation from Urdu to English to be dropped.*

MATHEMATICS

Revised in 2003

PREAMBLE

In the face of phenomenal advancement of knowledge, specially in Science and Technology the importance of Mathematics is immense today. Mathematics apart from being a subject, now a days, is treated as a concomitant to any subject involving analysis and reasoning. Mathematics has not only been found to play a greater role for the development of modern concepts of technology but it has also been found to be the origin of most modern technology like Computer Science. So it is desired that the student should be made conversant with the basic modern concepts of Mathematics from base level as far as practicable.

Thus the curriculum of Mathematics has to be suitably redesigned to bring it in line with the growth of the subject, growth of Science and Technology as also with the changing needs of the society.

The Higher Secondary Education is the linking stage of Secondary Education and Higher Education and other higher professional courses. So it is of utmost necessity to make Mathematics–education at Higher Secondary level broad based and meaningful. With this aim the new syllabus of Mathematics for Higher Secondary level has been revised. It is expected that the revised syllabus would form a strong foundation of Mathematical knowledge to have compatibility with All India Mathematics curriculum at plus two stage and also strengthen them in horizontal and vertical directions of mathematical logic.

The objective of the syllabus is to enable students to acquire knowledge and to develop an understanding of the mathematical terms, concepts, symbols, definitions, principles and formulae at Higher Secondary stage and also to train a student to think, analyse and to articulate logically.

OBJECTIVE

That Mathematics is fast acquiring importance hardly needs any reiteration. Its concomitant role to any discipline has been sought for developing logic and reasoning. Since days of antiquity, Mathematics has shaped not merely different aspects of science and technology but, as the recent trend shows, there is a vast growth of disciplines that are being mathematized. Mathematical Sciences has thus come to stay as a discipline in its own right with mathematics as its core. Information Sciences and Information Technology, Bio-medical Engineering, Bio-Sciences and Biotechnology are some of the leading pursuits in which role of mathematics is indispensable. It is, therefore, being increasingly realized that those students at every level and certainly at the higher secondary level should have exposures to methematics through its basics and applications as well. Any curriculum in mathematics has to necessarily reflect the developments of concepts in the subject, their use in respect of growing science and technology and also the changing needs of the society.

The Higher Secondary level being a link between the Secondary Education and Tertiary (Higher) Education with of course, several professional courses, mathematics education at the Higher Secondary level has to be necessarily broad-based in terms of concepts and applicability, as well. This forms the principal objective of syllabus of mathematics at the Higher Secondary level. The syllabus is structured keeping in view the following features :

(i) the revised syllabus at the Higher Secondary level has to have two papers, each of 100 marks.

(ii) the syllabus is to be covered wholly in the scheduled period; periods necessary to cover each topic are indicative. It is advisable not to spend inordinately longer period on a topic at the cost of doing justice for other topic.

(iii) the guidelines suggested by the Samanway Committee set up by the Government of West Bengal for purposes of maintaining continuity in syllabi of Madhyamik and Uchcha Madhyamik (Higher Secondary) levels have been considered; the mathematics syllabi of other Boards and Councils in different parts of the country have also been considered.

(iv) for obvious reasons, new topics embodying the ideas of probability, elementary ideas of Vector Algebra, rudiments of Sets, Relations and Mappings and also Determinants and Matrices in the re-designed syllabus, leaving out topics on Mensuration, Solid Geometry, Variation etc.

(v) Applicability and application of mathematics in life-centric situations need to be stressed while bringing out concepts in teaching-learning situations.

In sum, the overall aim of the syllabus is to enable students in acquiring and understanding few mathematical concepts, definitions, principles, symbols and formulae at the Higher Secondary stage. Evidently, a student, with this exposure, has to equip himself / herself with the ability to think, analyse and perhaps, articulate logically. It is hoped that applying mathematics to a real situation will shed a better understanding and insight of the situation.

The syllabus with details given has been designed so as to achieve the foregoing aims and objectives.

MATHEMATICS

Paper—I

Full Marks—100

1. Algebra [50 Marks]

Surds and Indices :

Fundamental laws of Indices, simple applications of surds and indices.

Arithmetic Progression : (A. P.)

Definition of A. P., Common difference, General term, Summation of first n terms. Sum of first n-natural numbers, A. M.

Geometric progression : (G. P.)

Definition of G. P., Common ratio, General term, Summation of first n-terms, G. M.

Logarithms :

Definition, General properties of logarithms.

Complex numbers :

Complex numbers in the form a+ib, Real and imaginary parts of a complex number, Geometrical representation of complex numbers, Complex Conjugate, Modulus and Arguments of a complex number, Algebra of complex numbers (fundamental operations). Triangle inequality $|Z_1+Z_2| \leq |Z_1|+|Z_2|$ and also $|Z_1 \, Z_2| = |Z_1|\,|Z_2|$. Cube roots of unity and their properties.

Theory of Quadratic Equations :

Quadratic equations with real coefficients. Fundamental theorem of Algebra (Statement only). Roots, relations between roots and coefficients of a quadratic equation, Nature of roots, formation of quadratic equation, common root. Sign and magnitude of the quadratic expression ax^2+bx+c (a, b, c are rational numbers).

Permutation and Combination :

Definition of Permutation. Permutation of n different things taken $r(\leq n)$ at a time; Permutation of n things, not all different; Permutation with repetitions (circular permutation excluded).

Definition of Combination; Combination of n different things taken r at a time; Combination of n things when things are not all different; Basic properties.

Probability :

Concept of Random experiments and their outcomes sample space. Events, certain and uncertain events. Equally likely outcomes. Classical definition of probability, addition rule, multiplication rule. (Venn diagram may be used).

Principle of Mathematical Induction :

Statement of the principle. Proof for the sum of squares, sum of cubes of first n natural numbers,, divisibility properties like $2^{2n}-1$ divisible by 3, $n\geq1$, 7 divides $3^{2n+1}+2^{n+2}$, $n\geq1$.

Binomial theorem for positive integral index :

Statement of the theorem, proof by the method of induction, general term, number of terms, middle term, equidistant terms.

Infinite Series :

Binomial theorem for negative integral and fractional index; exponential, logarithmic series, infinite G.P. series with ranges of validity (statements only). Simple application of the series. (Expansion of the series should be insisted upon.)

Matrices and Determinants :

Concept of $m \times n(m\leq3, n\leq3)$ real matrix. Types of matrices. Operations of addition, Scalar multiplication and multiplication of matrices, Inverse of 2×2 matrices.

Determinant of an $n \times n(n\leq3)$ matrix. Statement of the properties of determinant only.

Minors and Co-factors. Application of determinant in (i) finding area of a triangle (ii) solving a system of linear equation (not more than three variables) by Cramer's rule.

2. Trigonometry [25 Marks]

The associated angles :

$\theta(+\text{ve or} -\text{ve})$, $90^\circ\pm\theta$, $180^\circ\pm\theta$, $270^\circ\pm\theta$, $360^\circ\pm\theta$.

The Trigonometrical ratios of compound angles :

Sum and difference formula for sin $(A \pm B)$, cos $(A \pm B)$ etc.

Sum and difference as products.

$(A, B, A \pm B$ are all acute angles)

Multiple and submultiple angles :

Simple problems; Finding the values of sine, cosine and tangent of the angle θ where $\theta = 15^\circ, 18^\circ, 36^\circ, 72^\circ$.

General solutions of Trigonometrical equations :

$\sin\theta = 0, \cos\theta = 0, \tan\theta = 0$

$\sin^2\theta = \sin^2\alpha, \cos^2\theta = \cos^2\alpha, \tan^2\theta = \tan^2\alpha$

Trigonometrical inverses :

(Specific mention of principal values.)

Properties of triangles :

Basic relations between sides, angles, circum radius. Area of triangles of the form $\frac{1}{2}$ bcsin A. Simple and direct applications.

3. Coordinate Geometry of two dimensions [25 Marks]

(All discussions should be made in terms of rectangular Cartesian co-ordinate system)

Basic Ideas :

Distance formula, Section formula, Area of a triangle, condition of collinearity of three points in a plane.

Polar coordinates; Transformation from Cartesian to polar coordinates and vice-versa.

Parallel transformation of Axes.

Concept of locus. Elementary locus problems.

Equations of straight lines :

Slope of a line. Slope in terms of co-ordinates of two points on it. Equations of coordinate axes, equation of lines parallel to coordinate axes, slope – intercept form, gradient / slope form, equation of the line through two given points, intercept form, symmetric form, normal form; Every first degree equation in x and y represents a straight line.

Angle between two lines; conditions of perpendicularity and parallelism of two lines; Equation of a line parallel to a given line. Equation of a line perpendicular to a given line. Distance of a point from a straight line.

Equations of Circles :

Standard equation $x^2+y^2=a^2$. Equation of a circle with a given centre and radius. Equation of the form $x^2+y^2+2gx+2fy+c=0$ represents a circle. Equation of a circle in terms of the co-ordinates of the end points of a diameter. Parametric equation of a circle.

Conics :

Definition of conics (parabola, ellipse, hyperbola) given focus and directrix, eccentricity. Classification of standard conics (parabola, ellipse, hyperbola) in terms of eccentricity.

Parabola :

Standard equation, reduction of the form $x = ay^2 + by + c$ or $y = ax^2 + bx + c$ to the standard form $y^2 = 4ax$ or $x^2 = 4ay$ respectively; elementary properties and parametric equation of parabola.

Ellipse and hyperbola :

Standard equations only. Conjugate Hyperbola. Elementary properties. Parametric equations.

MATHEMATICS

Paper—II

Full Marks—100

1. **Sets, Relations and Mappings : [10 Marks]**

Idea of Sets, Finite and infinite sets, Empty set, universal set, subsets, Power set, Venn diagram, Complement of a set, operation on sets (Union, intersection, difference of two sets, De-Morgan laws) Inclusion / Exclusion formula for two or three finite sets. Cartesian product of sets.

Idea of relations, mappings, range and domain, injective, surjective and bijective mapping, Composition of mappings, Inverse of a mapping.

2. **Differential Calculus : [25 Marks]**

Idea of number system :

Integer, Rational, Irrational and real number.

Variables and functions :

Variables, Functions of single variable, Geometrical representations of functions of the form:

$ax + b$ (a, b rational), $\sqrt{x}$ $(x > 0)$, $\frac{1}{x}(x \neq 0)$, $|x|$, $\frac{|x|}{x}$ $(x \neq 0)$, x^2, sinx, cosx, tanx.

Idea of rational functions; idea of exponential and logarithmic functions. Increasing and decreasing functions, odd and even functions.

Limit and Continuity :

Idea of limit of a function with more stress on geometrical and intuitive approach. Algebra of limits (Statement only, no proof), $\lim_{x\to a} x^n$ (n, a positive or negative integer ($a\neq 0$) (statement only)

proof of $\lim_{x\to a}\frac{(x^n-a^n)}{(x-a)} = na^{n-1}$, where n is a positive integer. Use of the limits (without proof) $\lim_{x\to o}\frac{\sin x}{x}$, $\lim_{x\to o}\frac{e^x-1}{x}$, $\lim_{x\to o}\frac{\log(1+x)}{x}$, $\lim_{x\to a}\frac{x^n-a^n}{x-a}$ (n rational number), limit of a function of a function (statement only). Simple applications of the above limits. Idea of continuity of a function at a point. (Geometric and intuitive approach), simple applications.

Derivative / Differential coefficients of functions :

Derivative of a constant function, x^n (n-rational), sin x, cos x, e^x, log x from first principle. Working rule of derivative of x^n (n is a real number); Rules of differentiation of sum, product and quotient of two functions (Statement only). Differential coefficients of tanx, cotx, secx, cosec x, $\sin^{-1}x$, $\cos^{-1}x$, $\tan^{-1}x$, $\text{cosec}^{-1}x$, $\sec^{-1}x$, $\cot^{-1}x$. Differentiation of a function of a function. Implicit functions (statement only) – their derivatives. Differentiation of functions in parametric form.

Logarithmic differentiation. Second order derivative of a function.

3. Integral Calculus : [25 Marks]

Indefinite Integral : Integration as the inverse of differentiation. Primitive, integrals of $x^m (m\neq -1)$, sin mx, cos mx, sec mx, cosec mx, tan mx, cot mx, $(m\neq o), e^{mx}$, 1/x, (Assuming the functions and primitives are defined). Integral of the sum of two functions. Integration by simple substitutions; standard integrals of the form $\int\frac{dx}{x^2\pm a^2}$, $\int\frac{dx}{\sqrt{x^2\pm a^2}}$, $\int\frac{dx}{\sqrt{a^2-x^2}}$, $\int\frac{dx}{ax^2+bx+c}$, $\int\frac{(px+q)dx}{ax^2+bx+c}$; direct application.

Integration by parts :

Rule of integration by parts. Application in simple cases.

Standard integrals of the form :

$\int\sqrt{x^2\pm a^2}\,dx$, $\int\sqrt{a^2-x^2}\,dx$, $\int e^{ax}\sin bx\,dx$, $\int e^{ax}\cos bx\,dx$, $\int\sqrt{(ax^2+bx+c)}\,dx$, $\int(px+q)\sqrt{ax^2+bx+c}\,dx$, $\int\frac{dx}{a+b\cos x}$, $\int\frac{dx}{a+b\sin x}$.

Integration of rational algebraic functions by partial fractions of the form $\int\frac{dx}{(x-a)^m(x-b)^n}$ where m, n are positive integers and $m\leq 2$, $n\leq 2$.

Definite Integral : Definite Integral as the limit of a sum, definite integrals of x, x^2 and of a constant, from above definition. Fundamental theorem of Integral Calculus (statement only). Applications in simple cases. Properties of definite integral $\int_a^b f(x)dx = \int_a^b f(z)dz$; $\int_a^b f(x)dx = -\int_b^a f(x)dx$; $\int_a^b f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx$ (a<c<b).

$\int_0^a f(x)dx = \int_0^a f(a-x)dx$, applications to odd and even functions.

4. Differential Equations : [10 Marks]

Formation, order and degree of differential equations. Solution of first order and first degree differential equation of the form $\frac{dy}{dx} = f(x) \times g(y)$, $\frac{dy}{dx} = \frac{ax+by}{cx+dy}$ and of the form $\frac{d^2y}{dx^2} = f(x)$. use of initial conditions.

5. Application of Calculus : [24 Marks]

Tangent and Normal :

Geometric interpretation of differential coefficients. Slope of a tangent. Equations of tangent and normal to curves of the form $y = f(x)$ at the point (x_1, y_1) and application to circle, parabola, ellipse, hyperbola. Condition that the st. line $y = mx + c$ may be a tangent / normal to a circle or to a curve.

Differential coefficient as rate measurer.

Maxima and Minima :

Idea of Maxima and Minima of $y = f(x)$ at a point where $\frac{d^2y}{dx^2} \neq 0$ (statement only). Application to algebraic functions, sin x, cos x.

Determination of areas in simple cases :

Interpretation of a definite integral as an area. Calculation of areas bounded by circle, parabola and ellipse, ordinate and abscissa as the case may be. (sketch of the area is needed).

Expression for velocity and acceleration :

Expression for velocity and acceleration of a particle in terms of derivatives, velocity = $\frac{ds}{dt}$, acceleration = $\frac{dv}{dt}$, $\frac{d^2s}{dt^2}$, $v\frac{dv}{ds}$; where s represents the displacement.

With the above expression for velocity and acceleration to establish the formula $s = vt$ (v constant velocity), $v = u + ft$, $s = ut + \frac{1}{2}ft^2$, $v^2 = u^2 + 2fs$. Simple applications.

Vertical motion under gravity.

6. Vector : [6 Marks]

Vectors and scalars. Equal vectors, unit vector, zero vector. Position Vector of a point in terms of i and j. Localized and free vectors, collinear vectors, negative of a vector, components of a vector. Addition of vectors, multiplication of a vector by a scalar. Position vector of a point dividing a line segment in a given ratio. Application of vectors in geometry (Simple geometrical problems).

Note : (a) Total number of pages per paper should be within 450 pages of D/D size.

(b) The entire syllabus should be covered in 200 periods.

PHYSICS

Revised in 2003

Aims and Objectives :

Physics is the basic physical science that deals with the structure of matter and the interactions of elementary constituents that are susceptible to experimental investigations and theoretical studies. Aim of Physics is explication of basic observable phenomena without primary attention to the physical applications. Precise experimental measurements and theoretical formulations play complementary role in physics. Experiment discloses the facts of nature and theory makes sense out of them.

At the Secondary level all students are exposed to general physical science and some elementary laws without going into any details of either theoretical formulation or experimental techniques. Higher Secondary course is a transition from the general education for all students to specialized courses in different disciplines. The Higher Secondary Physics course is designed as an introduction to Physics for the students willing to pursue higher studies in science or technology. Although the primary aim of the present syllabus is to introduce the basic physical concepts and the necessary laws it also includes some applications of Physics like electronics. This should help the students to study some of the new science courses that have emerged recently because of the spectacular progress in technology over the last few decades.

Paper—I

Full Marks—80

Mechanics and Properties of Matter (40 Marks) (42 periods)

1. Physical world and measurement

Physics, Technology, Industry and Society. Units of measurement, systems of units, SI units, fundamental and derived units. Dimensions, checking of correctness of equation from the concept of dimensions. Periods–4

2. Particle Dynamics

Rest and Motion : Reference frame; displacement, velocity and acceleration : Momentum; kinematical equations (In one dimension); Velocity-time, position-time graphs, elementary problems.

Scalars and Vectors : vectors in three dimensions, composition and resolution of vectors, rectangular components in 2 and 3 dimensions, unit vector, representation of vector by coordinates, addition and subtraction of vectors by geometrical and analytical methods, commutative and associative properties of vector addition, multiplication of vectors, scalar and vector products

(two vectors only), relative velocity and acceleration.

Projectile motion (inclined plane to be excluded).

Newton's laws of motion; inertial force; units of force; impulse and impulsive forces;

Conservation of linear momentum, elastic collision of particles moving in the same line, jets and rockets; Friction : static and kinetic friction, coeff. of friction Periods–10

3. Statics

Centre of mass, centre of gravity, momentum conservation and centre of mass motion; conditions of equilibrium of a system of forces. Moment of a force about a point and about an axis; couple, torque. Periods–3

4. Dynamics of rotational motion

Rotational motion of a particle; angular velocity, angular acceleration, relation between angular velocity and linear velocity.

Angular momentum, relation between angular acceleration and torque (statement only), Moment of inertia and its physical significance (Formulae of moment of inertia to be assumed for uniform bodies with simple geometrical shapes) radius of gyration (definition only). Rotational kinetic energy, conservation of angular momentum with some examples.

Centripetal force, centrifugal force (as a pseudo force). Periods–5

5. Work, Energy and Power

Definition of work as a scalar product, relevant units, work done by and against a force, mechanical energy :– kinetic and potential. Conservation of energy — the case of a freely falling body. Conservative forces; conservation of mechanical energy (kinetic and potential energies), Potential, Non-conservative forces.

Mass-energy equivalence (qualitative idea only).

Power :– definition, units. Periods–3

6. Gravitation

Newton's Law of Universal Gravitation (statement and mathematical relation). Constant of gravitation (definition and value with units, no experimental determination) Examples of gravitational attraction between heavenly bodies (e. g. the Sun and the Earth, the earth and the Moon) Gravitational attraction of the earth, relation between G and g. Variation of g. Gravitational potential energy near the surface of the earth, gravitational potential, escape velocity, Motion of planets and satellites, statement of Kepler's laws of planetary motion. Geostationary and polar satellites. Weightlessness in orbiting satellites. Periods–5

7. Elastic properties of matter

Definitions, statements and explanation of the terms : stress, strain, elastic limit, Hooke's law, moduli of elasticity; Young's modulus, Bulk modulus, rigidity modulus, Poisson's ratio, principle of measurement of Y (no experimental details). Periods–3

8. Hydrostatics & Fluid Mechanics

Density and specific gravity (methods of determination not required). Condition of Floatation from Archimedes' principle. Pressure of fluids, pressure in a liquid, unit of pressure. Transmission of fluid pressure. Pascal's law, principle of multiplication of force, Hydraulic Press (principle only and problem, no descriptive details) Air pressure and its measurement, Torricelli's and Fortin's barometer, siphon.

Surface energy and surface tension, Capilarity, Laminar and Turbulent flow, Coefficient of viscosity, Bernouli's Principle (no derivation) and its simple applications, Stokes' law and terminal velocity. Periods–9

Heat and Thermodynamics (Marks–22) 22 periods

9. Temperature

Thermal equilibrium and temperature (Zeroth law of Thermodynamics) Period–1

10. Thermal expansion

Thermal expansion of solids and liquids; simple demonstrations; coefficients of linear, superficial and cubical expansion of solids, their relations. Application of expansion of solids, (compensated pendulum and bimetallic strip only) real and apparent expansions of liquids, Relation between expansion coefficients, anomalous expansion of water, effect on marine life. Expansion of gas – volume and pressure co-efficient. Periods–4

11. Calorimetry and change of state

Preliminary definitions; Principle of calorimetry (no questions on measurements to be set). Latent heat, brief discussion of determination, calorimetric problems. Effect of pressure on melting point and boiling point; Vapour pressure, Relative humidity. Difference between gas and vapour – critical temperature. Periods–3

12. Thermodynamics

Heat as a form of energy; relation between calorie and erg, First Law of Thermodynamics, Intensive and extensive thermodynamic variables. Isothermal and adiabatic expansion of gases (brief discussion), reversible and irreversible processes. Specific heats of gases, relation between c_p and c_v. Periods–5

13. Kinetic theory of gases

Evidence of molecular structure of matter and of random molecular motion. Brownian movement (qualitative discussion). Basic assumptions of kinetic theory of ideal gases. Mean, rms and most probable speed. Pressure of an ideal gas (simple derivation). Charle's law, Boyle's law, Avogadro's law and pressure law from kinetic theory of gases. Kinetic energy of molecules and absolute temperature; definition of mean free path. Periods–5

14. Transmission of heat

Conduction of heat, thermal conductivity, thermometric conductivity, convection of heat, radiation, radiation as a form of energy. Black body, Kirchhoff's law (statement only), Newton's Law of cooling, Greenhouse effect and global warming. Periods–4

Vibrations and Waves (Marks–18) **18 periods**

15. Vibrations

Periodic motion : Oscillation and its characteristic, periodic time, frequency, amplitude, Simple Harmonic Motion, Relation between SHM and uniform circular motion. Differential equation of SHM and its solution. Displacement, velocity and acceleration in SHM. Energy in SHM; Time period, frequency, amplitude and phase. Graphical representation of SHM. Simple pendulum, time period of simple pendulum, Superposition of two SHMs of same frequency in the same direction (a) in phase and (b) in opposite phase. Graphical and analytical treatment. Free vibration, Damped vibration (qualitative discussion with example). Forced vibration; resonance. Periods–6

16. Waves

Elastic waves – longitudinal and transverse; characteristics of propagating waves, nature of the medium, wave-length, amplitude of wave, time period, frequency, velocity of wave and their relation. Properties of waves : Laws of reflection and refraction of waves with reference to sound wave. Periods–3

Sound wave : longitudinal elastic wave, velocity of sound wave, statement and explanation of Newton's formula and Laplace's correction. Dependence of velocity on temperature, pressure and humidity of air. Periods–2

Superposition of waves – graphical and analytical representation : (i) two S.H. waves of nearly equal frequency and amplitude and moving in the same direction (beat) : determination of unknown frequency from beating frequency. (ii) Two S.H. waves of equal amplitude and frequency travelling in opposite directions (standing or stationary waves); characteristics of standing waves and comparison with progressive wave.

Transverse standing waves on stretched wire; laws of transverse vibration of strings, fundamental, harmonics. Periods–4

Longitudinal standing waves in air column. (i) Vibration of air column in a tube closed at one end. Determination of velocity of sound or the frequency of a tuning fork by resonance with vibration of air column in a tube closed at one end. (ii) Vibration of an air column in a tube open at both ends.

Doppler Effect in sound propagation. (derivation not required) Periods–3

Total Number of Periods : 82

Paper-I and 'Optics' Part of Paper-II to be taught in class XI:

Rest of Paper-II to be taught in class-XII.

Total number of periods (excluding tutorial) : 103 periods

Paper—II

Full Marks—80

Optics (Marks—20) **21 Periods**

1. Reflection at curved surface

Definitions of centre of curvature, pole, principal axis, principal focus, aperture, focal length of a spherical mirror, Mathematical relations between u, v, f and r. Formula for magnification.

Periods–2

2. Refraction of light

Laws of refraction (statement, explanations with ray diagrams); definition of refractive index (relative and absolute); cases of refraction from denser to rarer and from rarer to denser media, real and apparent depth.

Total internal reflection, critical angle, relationship between refractive index and critical angle, Transmission of light through optical fibre-brief principle only. Periods–3

3. Prism

Prism refracting surfaces, refracting angle, principal section, refraction through a prism, ray diagram showing deviation by a prism, $D = i_1 + i_2 - A$. Idea of minimum deviation (Dm), experimental and graphical only. Relation $\mu = \frac{Sin(A + D_m)/2}{Sin(A/2)}$ assuming that for minimum deviation $i_1 = i_2$; Thin prism, simple problems. Total reflecting prisms and its application in periscope. Dispersion – as a phenomenon of breaking up of a composite light into different wave-lengths.

Periods–4

4. Thin lenses

Thin lenses – Their construction. Basic definition – principal axis, principal foci, ray diagrams, showing image formation; Deduction of the lens formula for both convex and concave lenses. (any sign convention may be used consistently)

Different cases of image formation for both types of lenses. Power of lenses, definition only, correct location of images for extended objects at different positions by ray tracing method. Lens maker's formula (statement only) – simple problems. Two thin lenses in contact.

Periods–4

5. Optical Instruments and human eye

Photographic Camera (elementary ideas), simple and compound microscopes. Astronomical telescope, binocular. (Simple construction as a combination of co-axial lenses and ray diagrams showing final image formation – no discussion on aberrations, resolving power etc (Deduction of formula for magnification not needed). Human eye (defects and remedies only). Periods–3

6. Physical Optics

Wave front and Huygen's Principle; Reflection and refraction of plane wave at a plane surface using wave fronts (qualitative idea); Interference – Young's double slit experiment and expression for fringe width. Coherent sources. Periods–5

Electrostatics (Marks—12) **12 Periods**

7. Introduction

Electricity from friction, two types of electricity, repulsion is a surer test of electrification, explanation of charging by rubbing in the light of electron theory. Conductor and insulator.

Dielectric polarisation – physical explanation.

Charge resides on the outer surface of a conductor – Electric screening. Effect of curvature on surface density of charge. Action of points – discharging action of points, spraying action of points, collecting action of points, lightning conductor. Periods–3

8. Electrostatic field and electric potential

Coulomb's law of force between two point charges; permittivity, e.s.u. and S.I. unit of charge, electric intensity; Electric field due to a point charge. Electric lines of force, properties of lines of force. Electric dipole, electric field due to a dipole and behaviour of a dipole in a uniform electric field.

Electric flux, statement of Gauss' Theorem and its application to find field due to uniformly charged infinitely long straight wire, thin spherical shell. Potential at a point in the electric field; Potential difference between two points; e.s.u. of potential, practical unit of potential, potential of a charged conductor, potential of the earth, relation between intensity and potential (qualitative). Periods–6

9. Capacitance and capacitors

Capacitance of a conductor; factors affecting capacitance of conductor; capacitance of a spherical conductor, capacitors, parallel plate capacitors and capacitance, Unit of capacitance. Combination of capacitors in series and parallel. Types of capacitors. Van de Graff Generator.

Periods–3

10. Secondary Cell

Distinction between primary and secondary cells. Lead acid accumulator : construction; its emf when fully charged. Ampere – hour. Periods–2

11. Ohm's Law and resistance

Flow of electric charges in a metallic conductor, drift velocity and mobility and their relation with electric current. Ohm's Law; volt, ampere and ohm; resistance, resistivity, factors on which resistance of a conductor depends, combination of resistance in series and parallel, equivalent resistance; shunt, internal resistance of cells, Kirchhoff's laws – illustration by simple applications. Wheatstone Bridge, relation between resistances of branches when the bridge is balanced. Its application to P.O. Box and metre bridge for the determination of unknown resistance. Potentiometer – principle and applications to measure potential difference and for comparing emf of two cells. Periods–6

12. Heating effect of current

Joule's law, mechanical equivalent of heat and its determination by electrical method. Electrical energy, power, unit of power and energy (to be taught in S.I. units). Board of Trade unit of electrical energy.

Thermoelectricity, Seebeck and Peltier effect, thermo-emf, thermo current, thermocouple, thermo-emf depends on difference of temperature of the two junctions of a thermocouple and nature of the metals of the thermocouple. Periods–4

13. Electromagnetism-I

Concept of magnetic field, Oersted's experiment, Biot Savart law, Magnetic field due to an infinitely long current carrying straight wire and a circular loop; Ampere's circuital law and its application to straight and toroidal solenoids; Force on a moving charge in uniform magnetic and electric fields. Cyclotron frequency, force on current carrying conductor in a uniform magnetic field. Forces between two parallel current-carrying conductors-definition of ampere. Torque experienced by a current loop in a uniform magnetic field, moving coil galvanometer – its current sensitivity and conversion to ammeter and voltmeter, current loop as a magnetic dipole and its magnetic dipole moment; Magnetic field intensity due to a magnetic dipole (bar magnet). Tangent galvanometer : Bar magnet as an equivalent solenoid, magnetic field lines. Molecular theory of magnetism; Magnetic premeability and susceptibility, Dia-, para- and ferromagnetic substances, examples. Terrestrial magnetism : Magnetic elements, Definitions, Declination, Dip and Horizontal component of the earth's magnetic field; their explanation (measurements not required). Periods–10

14. Electromagnetism-II

Electromagnetic induction. Magnetic induction, magnetic flux, flux density. Faraday's laws of induction, induced emf; induced current; Lenz's law of electro-magnetic induction and

its justification from the principle of conservation of energy. Determination of the direction of induced current by Lenz's law, emf induced in a conductor moving in a magnetic field, Fleming's left-hand rule. Periods–4

15. Alternating current

Idea of alternating current (qualitative discussion only) Peak and rms values of alternating current/voltage. Elementary principles of dynamo and D.C. motor. Periods–4

Modern Physics (Marks—18) **19 Periods**

16. Electromagnetic waves

Electromagnetic waves and their characteristics (qualitative ideas only); transverse nature of electromagnetic waves. Electromagnetic spectrum (Radio, microwaves, infra-red, optical, ultraviolet, X-rays, -γ-rays). Periods–2

17. Semiconductors and Electronics

Elementary idea of energy bands in solids; intrinsic, p and n-type semiconductors, p-n junction diode and its characteristics, its use as half-wave and full-wave rectifiers, pnp and npn transistors, their CE characteristics. Binary numbers – basic concepts. AND, OR, NOT gates Periods–5

18. Quantum theory

Photoelectric phenomena, particle nature of radiation, Einstein's equation, threshold frequency, work function; energy and momentum of photon, photoelectric cell. Wave particle duality, de Broglie's hypothesis (qualitative idea only). Deduction of Bohr's formula and explanation of emission and absorption of radiation through electronic transition. X-ray emission, Moseley's law and atomic number. Periods–6

19. Atomic and Nuclear Physics

Fundamental constituent of atoms and their properties, importance of number of protons in atom, principle constituents of nucleus, atomic number, isotopes, mass number. Radio activity : its discovery, alpha, beta and gamma rays and their principal properties. Radioactive decay law, graphical representation only without deduction, half-life and decay-constant. Radio isotopes, artificial transmutation of elements with simple illustration. Nuclear fission and fusion : chain reaction, nuclear reactor-principle of operation. Thermo nuclear fussion as the source of energy in sun and stars. Periods–6

Total Number of Periods : 82 Periods

PHYSICS PRACTICAL

Full Marks—40

Two experiments one each from Group—A and Group—B are to be performed in the practical examination, Idea about eye estimation (question will not be set). Accuracy, precision of measuring instruments, errors in measurements, Significant figures to be taught.

Group—A **(Marks—12)**

1. To determine the volume of rectangular parallelopiped or a cylinder with the help of side callipers.
2. To determine the cross-section of a given wire by using a screw-gauge.
3. To determine the thickness of a given glass plate by using a spherometer.
4. To determine the volume and specific gravity of a given solid of irregular shape, heavier than and insoluble in water by hydro-static balance.
5. To determine the sp. gr. of a given liquid by Hare's Apparatus.
6. To determine the sp. Gr. of a given liquid by the sp. Gr. bottle.
7. To verify the laws of reflection of light by ray tracing with pins and to show that the object distance is equal to the image distance. (At least three different rays are to be taken and rays to be traced with pins).
8. To verify the laws of refraction of light (at least three different rays are to be taken).
9. To determine the focal length of a concave mirror by the method of coincidence.
10. To determine the velocity of sound in air by resonance of air column by elimination of end correction (neglect correction due to moisture and temp).
11. To verify Ohm's law using ammeter and voltmeter.

N.B. At least 8 experiments under Group—A are to be performed by each student.

Group—B **(Marks—18)**

1. To determine the sp. gr. of a body lighter than water by using hydrostatic balance.
2. To determine the sp. gr. of a granular solid insoluble in water with the help of a sp. gr. bottle.
3. To draw L-T^2 curve by determining time periods with the help of a simple pendulum for at least five different lengths of oscillations and to verify the proportionality of L and T^2.

4. To verify Boyle's law for a gaseous material using five different pressures – atmospheric pressure, 2 pressures below and 2 pressures above the atmospheric pressure – by showing PV as constant.
5. To verify Hooke's law by drawing load-elongation curve.
6. To determine unknown frequency of a tuning fork by using a sonometer (mass per unit length of the sonometer to be supplied)
7. To determine the focal length of a given convex lens by u-v method using pins or screen and a luminous object (at least five diff. object distances should be used).
8. To trace magnetic lines of force due to a bar magnet when its north pole is pointing north.
9. To verify the laws of combination of two resistances (a) in series and (b) in parallel by using a P. O. Box.
10. To determine the value of an unknown resistance with the help of a meter bridge (Neglect end-correction).
11. To determine the value of the reduction factor of a single coil tangent galvanometer by using three known current (measured by an ammeter) and hence to determine the value of an unknown current corresponding to a given deflection of the galvanometer.

N.B. At least 8 experiments under Group—B are to be performed by each student.

Note Book	6
Viva	4

Total Number of Periods : 40

Notes :

1. Steps to be taken to ensure that at least 8 experiments per group are performed by students before they appear for H.S. examination.

2. Tutorial classes of 25 periods for each (theory) paper are to be held.

3. Practical examination should be taken at the end of annual examination of class-XI and at the end of text examination of class-XII.

4. Textbook should be written paper wise exclusively within the contents of the syllabus. Each book should be limited to 300 pages.

CHEMISTRY
(Revised in 2003)
PREAMBLE

Chemistry is the science of molecular behavior. During the past few decades there have been tremendous changes in its content, methodology and applications. Side by side with the increase of scientific knowledge; many social and pedagogical issues have emerged on the scene. Students at the H.S. level should be competent enough to face the challenges before the society and must be equipped with problem-solving abilities and life skills. This is the main objective of the present exercise of revision of Chemistry curriculum at the H.S. level.

SALIENT FEATURES

1. The total course of 200 marks (M) has been divided into two papers (Paper–1 and Paper –II) each of 100 marks and each paper is to be covered by 100-125 periods (P) of 40 - 45 minutes duration, including tutorials, unit tests during the course of two academic years (i.e. 35 – 40 weeks, 6 periods per week)

2. Each paper of 100 marks has been further divided into theoretical part of 80 marks and practical part of 20 marks.

3. (a) Theoretical part of 80 marks of each paper has been subdivided into 8 course units.

   (b) Duration of examination for the theoretical part of 80 marks of a paper shall be 3 hours.

4. (a) Practical part of 20 marks of each paper has been subdivided into two course units, each of 10 marks and to be covered by 10-12 periods.

   (b) Total duration of combined practical examination of Paper–I (Unit –10) and Paper–II (Units -19 & – 20) shall be four hours in one day.

5. The course units have been arranged in a logical sequence. *The Fundamental Principles of Chemistry* which are supposed to provide the basis for interpreting facts have been included in Paper I and the course units are numbered in the sequence in which they are to be covered. Descriptive *Chemistry of Elements and Their Compounds* and their applications in various spheres of Chemical Science, Technology, Industry, Agriculture, Medicine, Life-process and Environment have been covered in Paper–II.

6. The revised curriculum will be able to develop among the young students an interest to study Chemistry as a discipline, apprise them with the interfaces of Chemistry with

other disciplines of science, viz., Physics, Life Science, Medical Science, Engineering, Earth Science, Agriculture and Technology. To a great extent, this curriculum will be able to eliminate from the minds of the young students the fear of memorizing facts without knowing their course. Students pursuing this revised curriculum will also be acquainted with various aspects of Chemistry used in day-to day life.

7. The course has been made self-contained and it broadly covers the fundamentals of Chemistry providing scope for cultivating problem-solving ability in the students, though some background knowledge in Chemistry at the Secondary School Science level is assumed.

8. Students having passed the H.S. Examination successfully with this revised curriculum in Chemistry will be able to confidently pursue basic sciences, professional courses like Engineering. Technology, Medicine and other applied courses in science and technology at their tertiary level, at par with their counterparts passing the equivalent standard under other Boards/Councils.

9. The revised curriculum of H.S. Chemistry will also give some openings to those who may enter the world of work after H.S. as terminal stage.

10. Under the existing time frame, the revised curriculum of Higher Scondary Chemistry will not only serve as a link of continuity between the Secondary and the tertiary level Chemistry, but also it will maintain the equivalence and uniformity in the standards at the National Level.

AIMS OF TEACHING CHEMISTRY AT THE HIGHER SECONDARY STAGE

Syllabus of Chemistry at the H.S. stage caters to the varied needs of students, who will be:-

I) pursuing Chemistry as a discipline at the tertiary stage.

II) opting for professional courses in engineering, medical, agriculture, pharmaceutical, plastics and polymer science etc.

III) entering the world of work after +2 stage.

The major aims of teaching Chemistry at the +2 level may be stated as follows :

1. To enable students to appreciate that knowledge of Chemistry is essential for unerstanding the structure and function relationship of every object, living and non-living in our environment.

2. To provide a knowledge base of the basic concepts, principles and processes in Chemistry for better understanding and application of the subject, beyond the earlier stage.

3. To enable the students to acquire basic laboratory and experimental skills while learning by doing.

4. To promote the habit of critical thinking, problem solving, designing of new experiments etc., for nurturing creativity.

5. To stimulate interest in group-work, community service, environmental education programme etc., for application of Chemistry in daily life.

COURSE STRUCTURE

H.S. Chemistry

(2 - Year Course)

200 Marks (M) : (200 –250) Periods (P)

⇩

Paper – I (100M)
Fundamental Principles of Chemistry

⇩

Theoretical (80 M) ⇩ 8 Course Units (100P)

Practical (20M) ⇩ 2 Course Units (20-25P)

Paper–II (100 M)
Chemistry of Elements & Their Compounds

⇩

Theoretical (80 M) ⇩ 8 Course Units (100P)

Practical (20M) ⇩ 2 Course Units (20-25P)

Text Books :

Text Books of H.S. Chemistry (Theoretical plus Pracitcal) should be within 350-400 standard size pages per paper, including exercise, study questions etc.

Paper –I	Theoretical	(350 pages)
Paper–II	Theoretical	(350 pages)

Paper – I :

(100 M) : (100–125P)

Fundamental Principles of Chemistry

Theoretical (80 M) (80 – 100P)

Unit –1	Atoms, Molecules & Chemical Arithmetic	(8M, 8P)
Unit –2	Radioactivity & Atomic Structure	(8M, 8P)
Unit –3	Chemical Energetics & Chemical Dynamics	(14M, 16P)
Unit –4	Chemistry of Solutions : Non-Electrolytes, Colloids & Electrolytes	(8M, 10P)
Unit –5	Chemical Equilibria : Applications to Acid-Base, Solubility & Redox Equilibria	(14M, 12P)
Unit –6	States of Matters : Gases, Liquids & Solids	(8M, 8P)
Unit –7	Periodic Table :	(10M, 8P)
Unit –8	Chemical Bonding & Molecular Structure	(10M, 10P)

Practical (20 M) (20-25P)

Unit –9	Basic Laboratory Techniques & Investigotory Projects	10M
Unit –10	Qualitative Chemical Analysis	10M

Paper – II :

(100 M) : (100–125P)

Chemistry of Elements & Their Compounds.

Theretical: (80M, 80-100P)

Unit–11:	Chemistry of Non-Metallic Elements & Their Compounds	(15M, 18P)
Unit–12	Chemistry of Metallic Elements & Their Compounds	(10M, 10P)
Unit–13	Chemistry of Organic Compounds (I) Aliphatic Hydrocarbons,	(8M, 8P)
Unit–14	Chemistry of Organic Compounds (2) Halohydrocarbons & Organometallic Copounds. Aliphatic Compounds with Functional Groups	(7M, 8P)
Unit–15	Chemistry of Organic Compounds (3) aliphatic compounds with functional papers.	(10M, 8P)
Unit–16	Chemistry of organic compounds (4) Aromatic Compounds.	(10M)
Unit–17	Chemistry in Industry	(10M, 8P)
Unit–18	Application Oriented Chemistry, Environmental Chemistry & Introduction to Biomolecules	(10M, 10P)

Practical (20M) (20 - 25P)

Unit–19	Quantitative Chemical Analysis	10M
Unit–20	Identification of Pure Compounds	10M

CHEMISTRY

Paper–I

Unit – 1 : Atoms, Molucules & Chemical Arithmetic (8M, 8P)

Dalton's atomic theory (Critical study). Avogradro's Hypothesis. Application of Avogradro's Hypothesis and deduction of M=2D and molar volumes of ideal gases at STP. Avogardo Number.

Atomic mass, molecular mass, Equivalent weight (no experimental determination required), Valency. Atomic Weight = Equivalent weight × Valency. Gram atomic weight, Gram molecular weight and Gram equivalent weight. Gay Lussac's Law of gaseous volumes. Mole concept.

Weight-weight, weight-volume Calculations. Eudiometry.

Percentage composition, empirical formula and molecular formula. Simple numerical problems.

Unit – 2 : Radioactivity & Atomic Structure (8M, 10P)

i) Natural Radioactivity: alfa, beta and gama-rays and their properties. Rate of radioactive decay, decay constant and half-life period of radio elements. Simple numerical problems.

ii) Stability of the atomic nucleus : Effect of neutron proton (n/p) ratio on the modes of decay, group displacement law, radioisotopes and their uses ($_6C^{14}$, $_{15}P^{32}$, $_{27}Co^{60}$ and $_{53}I^{131}$ as examples) isobars and isotones (definition and examples only), elementary idea about nuclear fission and nuclear fusion reactions.

iii) Concept of Nuclear Atom : electron, proton and neutron (charge and mass of), atomic number (δ). Extra nuclear structure: Rutherford's model and its limitations.
Line spectra of hydrogen atom.
Quantization of energy (Planck's equation $E = h\upsilon$), Bohr's model of hydrogen atom and its limitations, Sommerfield's modifications (elementary idea). The four quantum numbers: *n*, *l*, *m* and *s*; the *s*, p, d and f electrons, ground state electronic configurations of many electron atoms and mono atomic ions.
The Aufbau Principle, Pauli's Exclusion Principle and Hund's Rule.
The concept of atomic orbitals, shapes of s, and p orbitals (pictorial approach).

Unit – 3 : Chemical Energetics & Chemical Dynamics (14M, 16P)

Chemical Energetics : Energy changes in physical and chemical transformations. Internal energy change (ΔE) and Enthalpy Change (ΔH) in a chemical reaction. Hess's Law and its applications. Numerical problems.

The Law of conservation of energy. The first law of thermodynamics. Spontaneity of a chemical reaction. The Second law of thermodynamics.(no numerical problems Elementary idea about Entropy change (ΔS) and Free Energy Change (ΔG) significance of the relation : $\Delta G = \Delta H - T\Delta S$ (without derivation) examples with gaseous reactions. Numerical problems.

Chemical Dynamics : Dependence of reaction rates on concentration, pressure, temperature, catalyst, size of particles etc. concept of energy barrier and activation energy (qualitative non-mathematical approach).

Order and molecularity of reactions (determination excluded). First order reactions specific rate constant, half-life period. Numerical problems, examples of first order and second order reactions.

Unit – 4 : Chemistry of Solutions:

Non-Electolytes, Colloids & Electrolytes (10M, 10P)

Non-Electrolytic Solutions : Types of solution, vapour pressure of solutiions of solids in liquids and Rault's Law of relative lowering of vapour pressure, colligative properties: osmotic pressure, depression of freezing points and elevation of boiling poits of solutions & their relationships with molecular masses of solutes and solvents (without derivations) Numerical problems.

Colloidal Solutions : Differences from true solutions, hydrophobic and hydrophilic colloids (meaning, examples: and uses), coagulation and peptization of colloids; dialysis and its applications, Brownian motion, Tyndall effect and its applications.

Electrolytic Solutions: Specific conductance, equivalent conductance and ionic conductance (definitions only), Kohlrausch's law (statement only). Faraday's laws of electrolysis and their applications, the Faraday (F), unit of charge–the electron ($e = F/N$), Numerical problems.

Unit –5 : Chemical Equilibria : Applications to Acid-Base, Solubility & Redox Equilibria. (14M, 12P)

Chemical Equilibria: The Law of mass action, dynamic nature of chemical equilibria. equilibrim constants (K), Le Chatelier's Principle. Equilibrium constants of gaseous reactions (Kp and Kc) and relation between them (examples).

Acid-Base & Solubility Equilibria: Ionization of weak electrolytes, Ostwald's dilution law.

Ionization constants of weak acids and bases, ionic product of water, the pH – Scale, pH of aqueous solutions of acids and bases, elementary idea about buffer solutions and buffer action (examples only).

Stoichiometry of acid-base reactions, acid-base titrations, acid-base indicators (structures non evaluative).

Solubility and Solubility Products.

Common ion effect (examples) (No numirical problems)

Redox Equilibria: Oxidation-Reduction reactions as electron transfer processes, oxidation numbers, balancing chemical equations of redox reactions by oxidation number and ion-electron methods.

Standard electrode protentails (E°)

Electrode potentail series, feasibility of a redox reaction.

Significance of Gibb's equation: $\Delta G^\circ = -nF\Delta E^\circ$ (without derivation). (Numerical Problems)

Stoichiometry of redox reactions, redox titrations (examples). (no numerical problems.)

Unit–6 : Gas Laws (8M, 8P)

Gaseous state : Measurable properties of gases. Boyle's Law & Charles Law, absolute scale of temperature, kinetic theory of gases (postulates only), ideal gas equation: $PV = nRT$, $PV = (w/M)RT$;

Dalton's Law of partial pressure, Graham's Law of gaseous diffusion. Deviations from ideal behavior

Liquefaction of gases, real gases, Van der Waal8s' equation. (Numerical problems.)

Unit – 7 : The Periodic Table & The Chemical Families: (8M, 8P)

Modern periodic law (based on atomic number)

Modern periodic table based on electronic configurations, groups and periods. Types of elements representative (s–block and p– block) elements, transitional (d-block) elements and inner transitional (f–block) elements (lanthanides and actinides) and their general characteristics. Periodic trends in physical and chemical properties: atomic radii, valency, ease of ionization (elementary idea about ionization energy and electron affinity), electronegative metallic naure, acidic and basic natures of oxides and hydrides of the representative elements (up to $Z = 20$). Position of hydrogen and the noble gases in the periodic table, diagonal relationships:

Unit – 8 : Chemical Bonding & Molecular Structure (10 M. 10P)

Valency electrons, the octet rule, Electrovalent and covalent bonds with examples, Properties of electrovalent and covalent compunds. Limitation of octet rule (examples).

Directionality of covalent bonds, shapes of poly atomic molecules(examples), Concept of hybridization of atomic orbitals (qualitative pictorial approach): sp^3, sp^2 and sp hybridizations with typical examples.

Tetrahedral space model of carbon atom, single-bond, double-bond and triple - bond involving carbon atom with examples, a and π bonds.

Valence Shell Electron Pair Repulsion (VSEPR) concept (elementary idea)–shapes of H_2O, H_2S, CH_4, NH_3, CO_2, NO_2 and SO_2 molecules. Concept of resonance (elementry idea), resonance structures (examples). Elementray idea about electronegativity, bond

polarity and dipole moment. Hydrogen bonding (inter-& intra-molecular) and its effects on physical properties (MP, BP and solubility).

Double salts and complex salts and coordination compounds (examples only) coordination number (examples with coordination number 4 and 6 only)

Practical for Unit – 9 & Unit – 10 (20M, 20 - 25P)

Unit –9: Basic Laboratory Techniques & Investigatory Projects (10M, 10-12P)

Marks Distribution

(to be internally evaluated by continuous assessment)

1)	Basic Laboratory Techniques	:	3M
2)	Investigatory Projects	:	3M
3)	Viva-Voce	:	2M
4)	Laboratory Records	:	2M
	Total	**:**	**10M**

1. Basic Laboratory Techniques (All Compulsory) :

(i) Acquaintance with Bunsen burner / spirit lamp / LPG burner etc.

(ii) Bending of glass tube, glass rod, making jet etc.

(iii) Boring cork and fitting up of wash bottle.

(iv) Acquaintance with chemical balance and weight box (setting up of balance, labeling and weighing).

(v) Filtration and crystallization.

2. Investigatory Projects (All least three to be performed):

(i) Crystallization of sucrose / copper sulfate.

(ii) Study of rusting of iron: To study the increase of weight due to rusting of known weight of iron in moist air

(iii) Study of hydration of anhydrous salts ($Na_2\ CO_3$ / $Na_2\ SO_4$) : To study the increase in weight due to hydration in moist air.

(iv) Study of sublimation of camphor : To study the loss in weight due to sublimation in air.

(v) Study of heat of reaction : To study the rise or fall of temperature due to :

a) Dilution of conc. H_2SO_4 with water (addition of different volumes of conc. H_2SO_4 to fixed volume of water).

b) Neutralization of strong acid (HCl) with strong base (NaOH)

c) Dissolution of KNO_3 / $NaNO_3$ / NH_4Cl in water.

(vi) Preparation of hydrophilc sol (starch / egg / albumin) and hydrophobic sol (hydrated aluminum oxide / hydrated ferric oxide). their dialysis and comparison of precipitation values of NaCl, $(NH_4)_2$ SO_4, $BaCl_2$.

(vii) Study of dialysis of different samples of waste water and identification of different ions in the resulting solution by chemical tests (may be done during class-XII)

(viii) Construction of Voltic cell / Daniel cell and measurement of e.m.f. using voltmeter of high internal resistance.

(ix) Study of variation of e. m. f. of $Zn / Zn^{2+} || Cu^{2+} | Cu$ cell with change of concentration of electrolyte ($ZnSO_4$) / $CuSO_4$) at room temperature.

(x) Determination of pH of dilute solutions of acids and bases, buffer solutions and fruit juices using universal indicator paper / solution.

(xi) Determination of doses of bleaching powder required to disinfect samples of water from different sources.

(xii) Study of setting of mixtures of cement with lime, sand of different qualities. rice husk etc. with respect to time, volume and strength.

Unit – 10 : Qualitative Chemical Analysis (10M, 10-12P)

1. Detection of Acid and Basic Radicals by dry and wet tests (one acid radical and one basic radical from same or different samples soluble in water) from among : (4M)

   (a) Acid Radicals : Cl^-, S^{2-}, SO_4^{2-}, NO_3^-, CO_3^{2-}

   (b) Basic Radicals: Cu^{2+}, Al^{3+}, Fe^{3+}, Fe^{2+}, Zn^{2+}, Ca^{2+}, Mg^{2+}, Na^+, NH_4^+

2. Detection of Functional Groups (one functional group) in solid compounds from among: $-NH_2$ (aromatic) by characteristic tests (carbylamine test not to be performed), -OH (phenolic), -CHO / >C=O & –COOH (2M)

3. Viva-Voce (2M)
   (to be internally evaluated by continuous assessment)

4. Laboratory Records
   (to be internally evaluated by continuous assessment) (2M)

Paper – II

(100 M, 100-125P)

Chemistry of Elements & Their Compounds;

Theoretical

(for Unit 11 to Unit 18) (80M, 80 - 100P)

Unit –11 : Chemistry of Non-Metallic Elements & Their Compounds. (15M, 18P)

Carbon: Occurrence, isotopes, CO & CO_2 : production, properties and uses.

Nitrogen & Phosphorus : Occurrence, Isotopes, isolation from natural sources and purification, reactivity of the free elements. Preparation, properties, reactions of NH_3 and PH_3, N_2O, NO and NO_2; HNO_3; P_4O_6 and P_4O_{10}, H_3PO_3 and H_3PO_4.

Oxygen and Sulfur : Occurrence, isotopes, allotropic forms, isolation from natural sources and purification, properties and reactions of the free elements. Water. unusual properties of water, heavy water (production and uses). Hydrogen Peroxide and Ozone(production, purification, properties, reactions and uses). H_2S, SO_2 and H_2SO_4 (preparation properties reactions and uses)

Comparative study of the halogen family : Occurrence, physical states and chemical reactivities of the free elements, peculiarities of fluorine and iodine; hydracid of halogens (preparation, properties, reactions and uses) inter-halogen compounds (examples).

Unit – 12: Chemistry of metals (10M, 10P)

General principles of metallurgy : Occurrence concentration of ores, production and purification of metals, Mineral wealth of India.

Typical Members : Occurrence, extraction, purification (where applicable), properties and reactions with air, water, acids, non-metals in respect of following metals : Na, Ca, Al, Fe, Cu and Zn.

Manufacture of steels and alloy steel (Bessemer, Open Hearth and L. D. process).

Principles of chemistry involved in electroplating, anodizing, galvanizing.

Unit–13: Chemistry of Organic Compounds (I) (8M, 8P)

Aliphatic Compounds : Hydrocarbons, Compounds: Unique nature of the carbon atom – catenation. Classification of organic compounds, homologous series of compounds up to C_4 (open chain) and their IUPAC and trivial names, Structural isomerism.

Detection of special elements (N, Cl, Br, I and S) in organic compounds by chemical tests. Elementary principles of estimation of C, H and N in organic compounds. Determination of molecular masses of organic compunds (principles of silver salt method, chloroplatinate method, Victor Mayer's method and elementary idea about mass spectrometry). Problems on empirical formulae and molecular formulae.

Hydrocarbons : Petroleum as the industrial source of hydrocarbons. Alkanes: methane and ethane. Alkene : ethylene, propene, Alkyne : acetylene – (preparation, large scale production, properties and reactions (including the application of Markownikoff;s rule where applicable) and technical uses).

Unit –14: Chemistry of Organic Compounds (2) **(7M, 8P)**

Halohydrocarbons : General methods of preparation, general properties of haloalkanes, haloform reaction, chloroform & iodoform (preparation, properties and uses).

Organometallic Compounds : Preparation of Griganard's reagents and their synthetic applications for the preparation of alchols, aldehydes, ketones, acids and amines.

Aliphatic Compounds with functional groups : General methods of preparation, large scale production, properties, reactions, uses of individual compounds included in the syllabus and problems based on stoichiometry, structure, physical and chemical properties, reactions of functional groups :

Alcohols : methanol and ethanol (from fermentation)

Ether : diethyl ether,

Unit – 15: Chemistry of Organic Compounds (3) **(10M, 8P)**

Aromatic Compounds with Functional Groups : General methods of preparation, large scale production, properties, reactions, uses of individual compounds included in the syllabus and problems based on stoichiometry, structure, physical and chemical properties, reactions of functional groups :

Aldehydes & Ketones : Formaldehyde, acetaldehyde, and acetone.

Carboxilic acids & their derivatives : formic acid, acetic acid, and oxalic acid; acetyl chloride, acetic anhydride and acetamide.

Ester : ethyl acetate.

Nitro compounds, Amines, Cyanides and Isocyanides :

Unit – 16 : Chemistry of Organic Compounds (4) **(10M, 8P)**

Benzene and its derivatives : Coal tar distillation and isolation of benzene. Substitution reactions (Chlorination, nitration, sulfonation and Friedel – Craft reaction) on benzene derivatives, directive influence of substitutions (examples).

Preparation, properties, reactions and uses of chlorobenzene, nitrobenzene, aniline, phenol, benzaldehyde, benzoic acid, salicylic acid, anthranilic acid.

Preparation, reaction, and synthetic applications of benzenediazonium chloride. Toluene and its 0, m, p substituted derivaties and their side chain oxidations.

Problems based on stoichiomentry, physical and chemical properties, structure and reactions of functional groups.

Unit–17: Chemistry in Industry : **(10M, 10P)**

Large scale production (including physicochemical principles where applicable omitting technical details and uses of individual items)

(i) Heavy chemicals: Sulfuric acid (contact process), Ammonia (Haber's process), Nitric

acid (Ostawad's process), sodium bicarbonate and sodium carbonate (Solvey process).

(ii) Polymers, Polythene, Nylon 66, rubber from natural source including vulcanisation.

(iii) Electrochemicals: Sodium hydroxide, hydrogen, chlorine, bleaching powder as by product.

(iv) Fuel Gases: Coal gas, producer gas, water gas, LPG.

(v) Fertilizer : Urea, ammonium sulfate, super phosphate of lime.

(vi) Ceramics : Port-Land cement and glass.

Unit–18: Application Oriented Chemistry & Environmental Chemistry and introduction to Bimoleculoes (10M, 10P)

Application Oriented Chemistry :

(i) Main ingredients, their chemical natures (structures not required) and their side effects if any of common antiseptics, analgesics, antacids, pain killers, vitamin C.

(ii) Technical / Domestic / Medicinal uses of Chemicals : Baking powder, plaster of paris, calcium lactate, common alum, boric acid, borax, copper sulfate, epsom salt, oil of winter green, carbolic acid.

Environmental Chemistry :

Chemical nature of air, water & soil and their role in environment. Common modes of pollution of air, water and soil. Importance of Ozone layer. Important chemical interactions, reactions. Green House effect, Smog. Pollution of water by domestic and industrial effluents. Pollution & degradation of soil – Pesticides & fertilizers.

Introduction to Bio-molecules, :

(i) Carbohydrates : Pentoses & Hexoses Distinctive chemical reactions of glucose.

(ii) Amino Acids : Glycine, calamine, asperic acid, cysteiene (structure).
Zwitterrion structures of amino acids peptides bond. ADP & ATP : sructures and role in bloenergetics, Nucleic acids – DNA & RNA skeleton structures.

Practical for Unit 19 & Unit 20 (20M, 20-25P)

Unit – 19 : Quantitative Chemical Analysis (10M, 10-12P)

Marks Distribution:

1) Titrimetric Estimations : 6M

a) Acid – Base Titrations

b) Redox Titrations

1(a):Acid–Base Titrations (at least two be performed):

(i) Preparation of standard (N/10) oxalic acid solution and determination of strength of (N/10) sodium hydroxide solution.

(ii) Determination of strength of (a) (~N/10) Hcl solution, (b) (~N/10) acetic acid solution by titration with standard (N/10) NaOH solution (supplied).

(iii) Preparation of standard (N/10) sodium carbonate solution and determination of strength of (~N/10) Hcl solution.

(iv) Determination of acid content of lemon juice by titration with standared (N/10) NaOH solution (supplied).

1(b) : Redox Titrations (at least two to be performed) :

(i) Preparation of standard (N/10) oxalic acid solution and determination of strength of (~N/10) $KMnO_4$ solution.

(ii) Determination of strength of Fe^{2+} solution (Mohr's salt) by titration with standard (N/10) $KMnO_4$ solution (supplied)

(iii) Determination of strength of H_2O_2 solution by titration with standard (N/10) $KMnO_4$ solution (supplied)

(iv) Determination of strength of "hypo" solution (sodium thiosulfate, $Na_2S_2O_3$ $5H_2O$) by titration against standard (N/10 iodine solution (supplied) using starch indicator.

*** Demonstrations: Preparation of standard (N/10) solutions of oxalic acid / sodium carbonate.**

Unit – 20: Identification of Pure Compounds (10M, 10-12P)

1. Identification of single solid / liquid pure compond (inorganic / organic) by Chemical tests. (6M)

   a) ***Solids:***

   NaCl, NH_4Cl, $(NH_4)_2$ SO_4, Na_2CO_3, boric acid, borax, urea, glucose, sucrose, common alum.

   b) ***Liquids:***

   HCl, HNO_3, H_2SO_4, H_2O_2, formic acid, acetic acid (cacodyl oxide test not to be performed), methanol, ethoanol, acetone, glycerol.

2. Viva-Voce (2M)
   (to be internally evaluated by continuous assessment)

3. Laboratory Records (2M)
   (to be internally evaluated by continuous assessment)

BIOLOGICAL SCIENCES
Revised in 2004

Preamble

Biology, the science of life has fascinated scientists all over the world through the centuries because of the glimpses it gives of what it means to be alive – of how the living matter works. The term Biology is derived from the Greek word Bios – Life and logos – a discourse.

Aims and objectives :

1. Biological Sciences help in the arousal of awareness and interest of one's environment namely the plants, animals and the microbial world surrounding us.

2. It shows us how soil, water, air and sunlight (the abiotic part of the environment) and the biotic environment interact with one another to maintain the eco-balance, as well as how one factor of the environment is dependent on another for maintenance of the ecobalance.

3. The different attributes of intelligent citizenship such as sanitation, supply of safe drinking water, nutrition, pest and population control require a sound biological background.

4. Vital national policies concerned with matters like conservation of natural and human resources, population control, agricultural development, family planning and other health programmes need the knowledge of Biological Sciences.

5. Knowledge about the human system and its physiology creates health awareness and helps in the well being of the individual.

6. Presently modern subjects as Bio-Informatics, Bio-technology, Genetics, Molecular Biology are fast growing. The prospects of these subjects are ever increasing creating ample opportunity for research and job worldwide. Persuing these subjects for a career require a thorough knowledge of Biological Sciences.

BIOLOGICAL SCIENCES
Paper I

Full Marks — 80

Periods–70
Content Pages–200
Exercise Pages–50

Chapter	Heading	Contents	Periods	Pages
1.	Nature and Scope of Biological Sciences	1.1 Status of Biology 1.2 Science of Life 1.3 Biology in ancient period (Mention Charak, Susruta, Aristotle, Darwin)	2	1 ½ 2

Chapter	Heading	Contents	Periods	Pages
		1.4 Scope of Biology		2
		1.5 Importance of Biological Sciences in this millennium.		1
		Exercise – 2 pages		2
2.	Unit of Life	2.1 Tools and Techniques (Microscopes-Simple and Compound with diagram, EM (Brief idea)	2	2
		2.2 Cell fractionations and Tracer Techniques (Brief idea) (Principles and uses of ^{32}P, ^{14}C)		2
		2.3 Cell as the basic unit of life.	1	1
		2.4 Discovery of cell		1
		2.5 Cell Theory		1
		2.6 Ultra structural components of the cell wall, Plasma-membrane, Plastid, Endoplasmic Reticulum, Golgi Bodies, Mitochondria, Ribosomes, Lysosomes, Nucleus, Centrosomes, Microbodies, Microtubles, Cytoskeleton, Cilia and Flagella	6	12
		Exercise – 5 pages		5
3.	Cell Function	3.1 Diffusion-Definition and Factors	3	½
		3.2 Osmosis-Types, Membranes, Plasmolysis and Deplasmolysis		2
		3.3 Absorption—Active and Passive transport with mechanism		2
		3.4 Osmoregulation in fresh water and marine animals		1
		Exercise – 2 pages		2

Chapter	Heading	Contents	Periods	Pages
4.	Enzymes	4.1 Definition and Properties		1
		4.2 Types with examples	2	1
		4.3 Mechanism of Action (Lock and Key. Allosterism, Regulation of Enzyme action)		2
		Exercise – 2 pages		2
5.	Chromosome	5.1 Morphology of Chromosomes		3
		5.2 Parallelism between gene and chromosome	2	½
		5.3 Chemical Properties-Types of Nucleic Acids and differences		1
		5.4 Physical structure of DNA-Watson and Crick Model. Replication of DNA (Brief idea)	2	3
		5.5 Types of RNA (mRNA, tRNA, rRNA)	2	3
		Mode of transcription (Brief idea)		2
		5.6 NA as the genetic material (Experiments on bacterial transformation and viral transduction)	2	3
		5.7 Definition of Euchromatin and Hetero-chromatin and differences		1
		Brief idea of polytene and Lamp brush chromosomes		1
		Exercise – 7 pages		7
6.	Cell Division	6.1 Cell cycle and phases (control mechanism excluded)		1
		6.2 Important characters of malignant cell		1
		6.3 Process and significance of meiosis (with - diagram)	2	5
		Exercise – 3 pages		3
7.	Genetics	7.1 Laws of Heredity (Mendel's Laws of Heredity)		1
		7.2 (i) Backcross, Test cross, Incomplete dominance, Multiple Gene, Linkage, Crossing Over.	3	3
		(ii) Sex linked inheritance-Colour blindness, Haemophilia		2
		7.3 Mutation—Definition and types Importance of mutation.	1	3

Chapter	Heading	Contents	Periods	Pages
		7.4 Gene structure and function Mechanism of protein synthesis, (Brief idea) Genetic code.	1	2
		Exercise – 4 pages		4
8.	Photosynthesis	8.1 Major Photosynthetic pigments		
		8.2 Outline concept of light and dark reaction phases		
		8.3 Basic idea of bacterial photosynthesis	4	15
		8.4 C_2, C_3, C_4 pathway, C.A.M. (C_2 and CAM in brief with diagram only)		
		Exercise – 4 pages		4
9.	Respiration	9.1 Mechanism of glycolysis, Kreb's cycle (Flow chart only, no enzyme but A.T.P., H_2O and CO_2 calculation)		
		9.2 Outline idea of Electron Transport system		19
		9.3 Relationship of photosynthesis and respiration	5	
		9.4 Application of Fermentation		
		9.5 Photorespiration		
		Exercise – 4 pages		4
10.	Growth, Metamorphosis and Aging	10.1 Phases and factors of Growth		2
		10.2 Differences between plant growth and animal growth. Grand period of growth.	1	1
		10.3 Differences between growth and development		½
		10.4 Metamorphosis—Definition, Types and role of Hormones		1½
		10.5 Senescence and aging of plants and animals and its factors	2	3
		10.6 Abscission		1
		10.7 Pheromones		½
		10.8 Growth of seedlings and the role of Gibberellic acid	2	1
		10.9 Photoperiodism		2
		Exercise – 3 pages		3
11.	Origin and Evolution of Life	11.1 Haldane and Oparin concept of the Origin of Life		2
		11.2 Distribution of Life form in time and space (Through charts)		1
		11.3 Modern concept of Natural Selection		3
		11.4 Mimicry and Colouration	4	1

Chapter	Heading	Contents	Periods	Pages
		11.5 Speciation and Isolation		1
		11.6 Species concept		1
		11.7 Human Evolution in brief		2
		11.8 Bio diversity		4
		Exercise – 3 pages		3
12.	Population Biology	12.1 Concepts of Population Growth, Population control.		
		12.2 Mental health, Tobacco smoking and chewing, Alcohols and alcoholism, Drug addiction. Global immunization.	2	5
		Exercise – 2 pages		2
13.	Environmental Biology	13.1 Definition of Ecosystem and its dynamics (Detritus, biogeochemical cycles in brief)		7
		Concepts of Biosphere, with special refrence to Sundarban. Auto-ecology, Synecology	2	
		13.2 Environmental Pollution		6
		Concept of pollution of water, soil and air		2
		Source and nature of pollutants		
		Effects and probable control strategies of water and air Pollution (Brief description)		4
		Concept of noise pollution and radioactive hazards	3	2
		Biomagnification, Bio accumulation, 3 diseases due to excess absorption of metallic compounds in blood. Pb.—Dislexia, Hg—Manimata, Cd—Etai Etai.		2
		13.3 Green House Effect on biological system, Acid Rain, Ozone hole BOD, COD. Thermal pollution, Green Bench, Pollution Control Board and its role. Earth Summit. Toxicology of industrial wastes. Wet land as nature's kidney.	2	6
		Exercise – 4 pages		4
14.	Application of Biology	14.1 (a) Biofertilizers Pesticides and Biological Pest Control— Benefits and Hazards		1½ 2½
		(b) Domestication of animals and plants		3
		(c) Conservation of endangered Species (with examples, 2 from plant,2 from animal) Red Data Book, Green Data Book. Insects and their products- Seri, Api and Lac culture.	4	6

Chapter	Heading	Contents	Periods	Pages
		14.2 Biotechnology and its applications		
		(a) Cloning and Transgenic-Application in microbes, plants and animals		6
		(b) Sperm and Ova bank, Surrogate mother, Test Tube Baby.	2	2
		(c) Totipotency of cells and maintenance of cell line	1	2
		(d) Idea about plant cell and tissue culture, micropropagation.	1	4
		(e) Role of phytohormones in horticulture and agriculture	2	3
		(f) Bio-medical Applications (maximum 2 for each of the following)		
		(a) Diagnostic instruments: ECG, EEG, Auto-analyzer		
		(b) Imaging—USG, CT Scan, X-ray, Fluoroscopy, Endoscopy, MRI		4
		(c) Therapeutic: Laser Therapy, Dializer, Pacemaker (Reserve and Artificial), Heart-Lung Machine	2	
		Exercise – 3 pages		3

Paper II (Group-A)
Botany- Marks-25

Periods–30
Content Pages–85
Exercise Pages–10

Chapter	Heading	Contents	Periods	Pages
1.	Taxonomy	1.1 Definition, Importance, Relations of taxonomy with the classification of plant Kingdom.	1	1 2
		1.2 Rules of Bionomial Nomenclature.		½
		1.3 Hierarchy and Key, types of classification.	1	1
		1.4 Classification of plant kingdom.	1	
		Salient features of different groups {Algae, Fungi, Bryophyta, Pteridophyta, Gymnosperm, Angiosperm, (monocot and dicot) with examples of economically important plants	2	12

Chapter	Heading	Contents	Periods	Pages
		of major groups.} Some economically important		
		plants (Mention uses and edible parts only):		
		Algae—*Spirulina*		
		Fungi—Mushroom		4
		Bryophyta—*Sphagnum*		
		Pteridophyta—*Marsilia*		
		Gymnosperm—Pine		
		Angiosperm—Monocot-Bamboo Dicot-Jute or Lemon.		
		1.5 Life Cycle (in word diagram) with special reference to alternation of Generations—Definition,	2	
		Types.		2
		(Comment : 5 salient features of each group.	1	
		Figures of at least 2 specimen from each group.)		
		Exercise – 2 pages		2
2.	Virus and Bacteria	2.1 Characteristics of Animal Virus (Influenza Virus)		
		and Bacteriophage (T2), Reproduction.	1	1
		(Comment : 4 characters with diagram)		2
		2.2 Structure of TMV		2
		(Comment : Diagram)		1
		2.3 Structure of typical Bacterial cell (*E. coli*) and	1	2
		Reproduction : Asexual, sexual.		
		(Comment : Diagram)		
		2.4 Brief Bacterial Classification on the basis of		2
		(a) Morphology	2	
		(b) Nutrition type		
		(c) Staining behaviour		
		(d) Thermal sensitivity		
		(e) On the basis of flagella		
		(Comment : Chart and 1 example of each type.)		
		2.5 Utility of Bacteria		2
		(a) Agricultural-Rhizobium and other nitrogen fixing bacteria.		
		(b) Commercial-Beneficial for curd producing, tanning and in brewery.		
		(c) Medicine—Antibiotics and Vitamin synthesis.		
		Exercise – 2 pages		2
3.	Tissue and Tissue Systems	3.1 Tissue :	1	10
		Definition		
		Types—Meristematic and permanent tissue.		

Chapter	Heading	Contents	Periods	Pages
		(Comment : Types with characterization and function)		
		(Emphasis on permanent complex tissues)		
		Concept of cambium and secondary growth.		1
		(Comment : Chart and diagram of each type)		
		3.2 Tissue Systems	2	
		Definition :		2
		Types :—		
		(a) Epidermal with examples of Root hair, Stem hair and Stomata. (Comment : Diagram)		
		(b) Ground		2
		(Comment : Charts and diagram)	1	
		(c) Vascular—types with examples		2
		Stele—its major types		
		(Comment : Charts and diagram)		
		Exercise – 2 pages		2
4.	Forms and Functions of Plants	4.1 Morphological Features and Functions of		
		A. Root—Morphology and functions of tap and adventitious roots.		
		(Comments : Diagram)	1	
		(a) Differences between Tap and Adventitious Roots.		4
		(b) Modifications—Raddish, Prop root, Pneumatophore, Epiphytic root-Functions Forms, Examples.		
		B. Stem		
		Introduction—Morphology and Functions.		
		Modifications	1	
		Sub-aerial-Off set-Water Hyacinth		
		Under ground-Potato		2
		Aerial—Phylloclade—Cactus		
		Thorn—Duranta		
		Bulbil—Diascorea		
		(Comment : Definition, Example and figure)		
		C. Leaf—Morphology, functions		1
		Phyllotaxy—Types with example		
		Stipule—Normal two types :	1	
		(a) Free lateral—China rose		
		(b) Adnate—Rose		1

Chapter	Heading	Contents	Periods	Pages
		Modified two types : (a) Foliaceous—Pea (b) Spinous—Acacia Leaf Modifications : Spine of Cactus, Pitcher plant phyllode. (Comment : All examples should be explained with figure.)		
		Types of leaves : Simple, Compound—pinnate, palmate (mention all subdivisions) (Comment : In a chart, with example and diagram)		1
		(Homophylly and Heterophylly. (Comment : Mention only with diagram)		½
		D. Flower (a) Typical flower (China rose)—Different parts. Flower as a modified shoot. Types of flower : regular, irregular, actinomorphic, zygomorphic. (Comment : Examples with diagram)		4
		Cohesion and adhesion of stamens : Monadelphous, Diadephous, Polyadelphous, Epipetalous, Episepalous, Gynandrous.	2	
		Relative position of different whorls of flower on the thalamus : (Comment : Examples with line of diagram) Hypogynous, Perigynous, Epigynous Types of ovary—Superior, Inferior *Placentation, *Aestivation—Definition (*Comment : Example of Musaceae and Malvaceae)		2
		(b) Floral formula : Definition, Symbols used in floral formula. Floral formulae of the following families/ plants— Moncot—Banana (*Musa paradisiaca*)	3	

Chapter	Heading	Contents	Periods	Pages
		Fam.—Musaceae. Dicot—China Rose (*Hibiscus rosa-sinensis*) Fam.—Malvacaae.		
		(c) Inflorescence—Definition, Major types- (i) Cymose—Definition with Example (ii) Racemose—Definition with Example (iii) Special—Hypanthodium or cyathium —Definition with Example. (Comment : Detail classification not required. All types should be explained with line drawing and real figure.)	1	2
		(d) Pollination—Definition	1	2
		Types-Self and cross pollination		1
		Agents of pollination Characteristic features in relation to pollination type Merits and demerits of Self and Cross Pollination (Briefly)		
		(e) Fertilization—Process of double fertilization in a flowering plant. (Comment : Diagram)	1	2
		E. Fruit : Definition only with examples.	1	
		Types : True and False True : Simple—Mango (Comment : Figure with L. S.)		1
		Aggregate : Custard apple (Comment : Figure with L. S.) Multiple—Jack fruit or Pine apple (Comment : Figure with L. S.) False : Apple		1
		F. Study of Seeds : Dicot & monocot		1
		Edible parts of some known fruits : Apple-Thalamus; Dilennia—Calyx; Pomegranate (Bedana)—Succulent testa; Mango—Mesocarp; Pea-Cotyledon; Coconut-Endosperm; Rice-Endosperm. Dispersal of fruits and seeds	1	
		Types with examples.		1

Chapter	Heading	Contents	Periods	Pages
		Description of a monocot & dicot plant (Comment : Rice & Pea with charts)		2
		4.2 Plant Breeding : Definition, significance.		3
		1. Hybridization : Definition. Hybridization Technique : Emasculation.	1	
		2. Breeder's Kit (Brief idèa) (Comment : with charts and diagrams)		2
		Exercise – 4 pages		4

Total Periods-25
Content Pages–80
Exercise Pages–9

Group B
Zoology-Marks—25

Chapter	Heading	Contents	Periods	Pages
1.	Classification of Animal Kingdom	(a) Classification with salient features of each phylum; Non-chordates up to phylum; Example of each phylum. (b) Chordates : Characterstics of Hemichordata, Urochordata, Cephalochordatra with examples. (c) Vertebrata : Characteristics of Agnatha, Gnathos-tomta, Osteichthyes, Chondrichthyes, Amphibia, Reptilia, Aves, Mammalia with example. (d) Mammalia : Salient features of Prototheria, metatheria and eutheia. (Comment : Minor coelomate and acoelomate phyla excluded.) Exercise – 2 pages	5	20 2
2.	Outline features of mammalian form (Eutherian) Guineapig (Cavia porcellus)	(a) External features (b) Digestive System with special reference to Coprophagy or Caecotrophy. (c) Respiratory System (d) Anatomy of Heart together with flow chart of blood circulation through heart (e) Arterial System-Distribution of main arteries only (f) Venous System-Distribution of main veins with special reference to Hepatic portal System. (g) Excretory System (h) Reproductive System (Comment : Necessary diagram for each system to be drawn.) Exercise – 2 pages	6	30 2
3.	Outline Knowledge of Medical Zoology	(a) Outline idea of disease, their causative organism, mode of infection, symptoms and preventive measure of : (i) Malaria (ii) Filaria (iii) Ascariasis (iv) Taeniosis (b) Distinguishing features of Culex, Anopheles and Aedes. (c) Life Cycle and Comparative study of Culex and Anopheles. (d) Control measures of mosquito. (Comment : Mention other mosquito borne disease—like encephalitis, meningitis; Tsetse fly carrying	4	8

Chapter	Heading	Contents	Periods	Pages
		Trypanosoma causing sleeping sickness; Leishmania causing Kalazar.) Exercise – 2 pages		2
4.	Outline Knowledge of Agricultural Zoology	A. Fishery—Pisciculture (i) Briefly explain with example-Major Carp, Minor Carp. (ii) Comparison between major and minor carp (iii) Brief idea with example of exotic fish (iv) Mechanism of induced breeding-hypophysation. (v) Management of—Culture of major carp, composite culture and composite mixed culture. (vi) Common diseases of carp—Gill rot, fin or tail rot, Dropsy.	3	6
		B. Pest and their management (i) Definition of Pest (ii) Types of Pest— (a) Mamalian pest—Nature of damage by *Bandicoota bengalensis* (b) Insect pest-Mention the names of *Trypoyza incertulus, Leptocorisa acuta, L. vericornis. Hispa armigera.* (d) Outline idea of biological control of insect pest-control of mosquito by Gambusia, Panchax, Telapia, etc. Exercise – 2 pages	2	6 2
5.	Outline idea about Economic Zoology	(a) Poultry—Types of poultry birds; high yielding varieties of poultry birds.–1 page (b) Prawn Culture—Methods with special reference to tiger prawn. –1 page (c) Pearl Culture-Importance of pearl culture.-1page (d) Apiculture—Types of honey bee (drones, workers, queen); Composition and uses of honey.-2page (e) Sericulture—Types of mulberry plants; Definition of Silk; types of silk and silk worm (Muga, Endi, Tussore and mulberry silk) Life cycle of mulberry silk worm with reference to diapause and voltinism. Structure of silk worm larva and silk gland. Disease of silk worm—Flacheri, Muscardine, grassarie, pebrine. Control of Muscardine only.–5 pages Exercise – 2 pages	5	10 2

Group C

Physiology-Marks—30

Periods-45

Pages-110

Chapter	Heading	Contents	Periods	Pages
1.	Conservation of matter and energy in the human system			
	(a) Nutrition	Basic Constituents of food and their nutritional significance. B.M.R.—factors controlling, Respiratory quotient (Definition and significance only)	1	
		(Vitamins—dietary sources, functions, deficiency symptoms (in tabular form). Provitamin, Antivitamin, Pseudovitamin, Hyper-Vitaminosis (Definition only.)		8
		Nitrogen Balance. Biological and Nutritional value of protein.	1	
	(b) Biochemistry and Metabolism	Classification and properties of carbohydrates, lipids and proteins.	1	
		Metabolism Definition only. Elementary idea only of the following metabolic pathways (only biochemical pathways, no enzyme names needed) : Glycogenesis, glycogenolysis, Gluconeogenesis. Oxidation of fatty acids. Ketone body formation and its significance. Amino acid pool. Deamination, Transamination and Decarboxylation. (Definition only). For glycolysis, Kreb Cycles and electron transport chain—refer Paper I only.	3	8
	(c) Alimentation	Structure in relation to functions of the alimentary canal and the digestive glands.	1	
		Functions of the digestive juices including bile. (Saliva, gastric juice, pancreatic juice, intestinal juice)	2	
		Digestion and absorption of carbohydrates, lipids and proteins in tabular form.		8
	Clinical conditions of G-I system	Scurvy, Peptic and Gastric ulcers. Gastritis, Cirrhosis of Liver. Colon cancer. Starvation, Fasting and obesity.	1	
		Exercise – $1^1/_2$ pages		$1^1/_2$
2.	Blood and the Body fluids	Composition and Function of Blood.		
		Blood Coagulation—Process in Brief and anticoagulants. Use of Na-citrate as anticoagulant in blood bank.		4

Chapter	Heading	Contents	Periods	Pages
		Blood group—A B O System and Rh factor.		4
		Blood Transfusion.		
		Lymph and tissue fluid formation and function.	2	
		Exercise – 1 pages		1
3.	Cardio Vascular System	Anatomy of the Heart, Junctional tissues of the heart.	1	
		Origin and Propagation of cardiac impulse.		
		Histological structure of arteries, veins and capillaries		
		Cardiac Cycle—Arterial and ventricular events only.	1	
		Cardiac Cycle Time. Heart sound.		
		Cardiac output—Definition. Stroke volume and Minute volume. Principle of measurement only. (Fick method.)		
		Blood Pressure, Factor controlling & Measurement.	2	12
		Causes of common cardio-vascular Diseases—Dictary Factors. Smoking, Stress, Diabetes, Alcoholism. Cyanosis (Blue Baby.)	1	
		Exercise – 1 pages		1
4.	Respiratory System	Respiratory tract : From Larynx-Lung	1	
		Mechanism of breathing-role of respiratory muscles : intercostal muscle and diaphragm only.		
		Significance of physiological and anatomical dead space.		
		Tidal volume, insp. and expiratory reserve volumes, residual volume, vital capacity. (Definition & vol. Only).	1	
		Composition of inspired, expired and alveolar air.		10
		Active and Passive smoking.		
		Common Respiratory Diseases and their causes—Asthma, Tubercolosis, Lung Carcinoma.		
		Hypoxia, Anoxia, Apnoea, Dyspnoea. (Definition only).	1	
		Mountain sickness and acclimatization. (in brief)		
		Exercise – 1 pages		1
5.	Nerve and Muscle–The Excitable Tissue	Different types of muscles and their structure (in brief with diagram)	1	
		Red and white muscle		
		Fast and slow muscle.		
		Properties of muscle— (1) Excitability, (2) Contractility, (3) All or None Law (4) Refractory Period, (5) Summation of stimuli, (6) Tetanus, (7) Rigor Mortis.	1	

Chapter	Heading	Contents	Periods	Pages
		Sarcotubular System and the mechanism of muscle Contraction.		10
		Isometric and Isotonic Muscle Contraction.		
		Receptors—Classification in brief (According to function).	1	
		Synapse—Structure and mechanism.		
		Exercise – 1 pages		1
6.	Nervous System	A Brief outline of the organization and basic function of N. System (Central & Peripheral)	1	
		Functions of 5 Major Parts of the Brains—Cerebral Cortex, Thalamus, Pons, Cerebellum, Medulla.	1	6
		Cranial Nerves : Distribution and function	1	
		Ventricles of the Brains and C. S. F.		
		Sp. Cord.—Structure and Major Functions.		
		Reflex Arc (Types) and Reflex Action : Conditioned and unconditioned reflexes.		
		Functions of the Autonomic Nervous System.		
		Nervous System—Sympathetic and Parasympathetic : Functions.		
		Exercise – 1 pages		1
7.	Endocrine System	Definition of Endocrine gland and hormones.		
		Classification of Hormones.	1	10
		Elementary Idea of Hormone Action. (Proteins and Steroid Hormones).	1	
		Functions and disorders and related diseases of the following glands:		
		(i) Pituitary (ii) Thyroid (iii) Pancreas (iv) Adrenal (v) Parathyroid (vi) Placenta.	2	
		Elementary idea of gastrointestinal hormones.		
		Prostaglandins—Definition and Functions.		
		Exercise – 1 pages		1
8.	Excretory System	Histology and function of the nephron. (Brief idea)	1	8
		Diabetes insipidus.		
		Normal and Abnormal Constituents of urine.		
		Accessory Excretory organs—Skin, Liver, Salivary Gland, Large Intestine (mention only).	1	
		Exercise – 1 pages		1

Chapter	Heading	Contents	Periods	Pages
9.	Skin and Body Temperature Regulation	Physiology of sweat secretion, Sensible and insensible perspiration. Role of hypothalamus in body temperature regulation.	1	2
		Exercise – $^1/_2$ pages		$^1/_2$
10.	Reproduction and Developmental Biology	Primary and Secondary sex organs and the secondary sex characters. Testis—Histology, Testicular Hormone and their functions.	1	10
		Spermatogenesis with structure of sperm. Ovary—Histology. Ovarian hormones and their functions, oognesis with structure of mature grafian follicle. Menstrual cycle and estrus cycle. (Brief idea)	1	
		Fertilization and Implantation A brief idea about cleavage, morula, blastula and gastrula formation.	2	
		Exercise – 1 pages		1
11.	Social Physiology	Balanced Diet : Balanced diet for infants. growing children, students, pregnant woman and aged. (in tabular form).	2	6
		Malnutrition and causes of PCM, Marasmus, Kwashiorkor, Iron and Iodine Deficiency. (Brief idea)	1	
		Population problem and its control. Brief idea of *in vitro* fertilization.	1	
		Sexually transmitted diseases—Syphilis, Gonorrhoea, AIDS and its Prevention. Hepatitis B and its Prevention. Polio–immunization (Pulse polio). Amniocentesis and inequality of sexes. Female foetocide.	2	
		Exercise – $^1/_2$ pages		$^1/_2$
12.	Immunology	A brief idea of antigen and antibody. Elementary knowledge of inherited, acquired, humoral, cell mediated immunity. Active and passive Immunity.	2	4
		Exercise – $^1/_2$ pages		$^1/_2$